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Division of Agricultural Sciences
UNIVERSITY OF CALIFORNIA

FARM ADJUSTMENTS AND EARNINGS UNDER 1955 COTTON ACREAGE ALLOTMENTS

I. Upper San Joaquin Valley Cotton Farms, 1953–55

Trimble R. Hedges

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GIANNINI FOUNDATION OF AGRICULTURAL ECONOMICS
In Cooperation with PRODUCTION ECONOMICS RESEARCH BRANCH
AGRICULTURAL RESEARCH SERVICE, U. S. D. A.
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H. Russell Shaw, Assistant Professor of Agricultural Economics, Assistant Agricultural Economist in the Experiment Station, and on the Giannini Foundation assisted in collecting field data, as did Charles C. Carpy, Assistant Specialist in the Experiment Station and on the Giannini Foundation. The latter also assisted in the analysis.

John C. Crecink, Agricultural Economist, Warren R. Bailey, Assistant Head Western Field Research Section, and M. L. Upchurch, Head Western Field Research Section, all of the Production Economics Research Branch, participated in outlining and developing the project outline and plans.

We are indebted to farmers, dealers, and representatives of various State and Federal agencies serving agriculture for making information and data available for this investigation. We particularly thank the California Agricultural Stabilization and Conservation Committee for permitting us to use aggregate data from their county files, and the California Agricultural Extension Service for aiding and facilitating our questionnaire survey of farmers holding acreage allotments in 1954.

Finally, the credit for the statistical work goes to the personnel in the Giannini Foundation.

Trimble R. Hedges

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FARM ADJUSTMENTS AND EARNINGS UNDER 1955 COTTON ACREAGE ALLOTMENTS

1. The Upper San Joaquin Valley

HERE ARE THE HIGHLIGHTS OF THE FINDINGS:

WATER is a serious problem in the Upper San Joaquin Valley; about half of the irrigated land is highly productive, with the remainder of good quality.

See Pages 11 to 18

COTTON HAS DOMINATED crop farming in the Upper San Joaquin Valley when allotments are not in effect since World War II, both in acres and dollar value of production.

See Pages 6 to 10

INVESTMENTS AND FIXED COSTS ARE HIGH on Kern County cotton farms, and the reason that farmers have planted over two-thirds of their irrigated land to cotton is the ability of this crop to return high yields, gross returns and profits under these conditions.

See Pages 35, 37, 69, 100

COTTON ACREAGE ALLOTMENTS CUT COTTON ACRES BY ABOUT 45 PERCENT between 1953 and 1955, and farmers planted most of the diverted acres to alfalfa hay, grain, or alfalfa seed, or fallowed them.

See Pages 20 to 32, 34,67, 98

FARMERS SELECTED THEIR FIELDS, PRACTICED ROTATING BETWEEN COTTON CROPS, AND DID A MORE EFFECTIVE JOB in preparing seed beds and other cultural operations on cotton.

FARMERS ALSO INCREASED THEIR INPUTS of fertilizer, irrigation water and other services after allotments.

See Pages 39 to 44

THE INCREASED YIELDS OFFSET ABOUT ONE-FOURTH of the effect of the acre cuts on production.

See Pages 40, 87, 116

A PRICE RISE FOR COTTON reinforced the higher yields and the reduced total variable expenses to cushion the impact of the allotments on farm earnings in 1955.

See Pages 53, 57, 89, 91, 116, 117

PRICE RISES FOR BOTH POTATOES AND ALFALFA HAY enabled farmers producing these crops to adjust to the cotton allotments. Some farms with sizeable potato acreages had higher earnings in 1955 than in 1953.

See Pages 54, 62, 93, 94, 123, 124

OPERATORS ON FARMS WITH SOIL AND WATER PROBLEMS had difficulty in selecting profitable crops to replace cotton. At best their substitute crops merely absorbed some of the fixed costs, and their total farm profits dropped.

See Pages 64, 85, 119

HIGHER PROFIT RATES ON THE 320-ACRE FARMS indicate some scale or size advantage, but none appeared for the 160-acre farms which showed about the same rates as the 80's.

See Page 133

FARM ADJUSTMENTS AND EARNINGS UNDER 1955 COTTON ACREAGE ALLOTMENTS

1. The Upper San Joaquin Valley [a]

Trimble R. Hedges [b]

COTTON ACREAGE CUTS PRESENT FARMERS WITH SERIOUS PROBLEMS; THIS STUDY UNDERTAKES TO DEFINE AND ANALYZE THE EFFECTS OF SUCH CUTS ON RESOURCE USE AND EARNINGS.

The Problem is One of Idle or Underemployed Resources

The California Agricultural Stabilization and Conservation Committee assigned cotton acreage allotments to individual farmers in Kern and other cotton growing counties of California in early 1954.[c] The total California cotton acreage allotment in 1954 represented roughly two-thirds of the 1953 acreage. The allotments in 1955 were slightly over half the 1953 acreage. Cotton acreage cuts in the Upper San Joaquin Valley were comparable to those for the State. Kern County averaged 231,000 acres of cotton during the five years 1947-48, 1950-1952 and 326,300 acres in 1953. The 1955 crop was estimated at 178,650 acres representing 54% of the 1953 figure.

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[a] This report is the first of a series based on detailed investigations of the changes in farm organization, production and earnings under the cotton acreage allotments beginning in 1954. This research comes under California Agricultural Experiment Station Project Number 1641, and is partially supported under Lint Project PE e3, Production Economics Research Branch, USDA.

[b] Trimble R. Hedges is Professor of Agricultural Economics, Agricultural Economist in the Experiment Station, and Agricultural Economist on the Giannini Foundation, University of California, College of Agriculture, Davis.

[c] The cotton acreage allotments resulted when farmers voted favorably in a national referendum on marketing quotas that the Secretary of Agriculture announced in late 1953. The Secretary had no alternative under the Federal Law than to establish marketing quotas. See Hedges, T.R., and C.O. McCorkle, Jr. Cotton Quotas and Allotments and California Farm Adjustments in 1954, Giannini Mimeographed report No. 161.

The drastic cut in cotton acreage is the chief problem of farmers in the Upper San Joaquin Valley under the acreage allotment program. This problem is aggravated because available substitute crops return the growers distinctly less net income than cotton on most of the acres released from cotton. Farmers, therefore, are planting their diverted acres to much less profitable crops or even leaving a part of the former cotton acreage idle. They also have found it difficult to reduce fixed costs in proportion to the cuts in cotton acreage and total net farm income suffered accordingly.

Farmers, for the above reasons, are seeking to maintain earnings or to minimize their losses in spite of the allotments. One corrective measure they have used is to increase cotton yields on the acreage they are permitted to plant, but this has definite limits.

The size of the farm operation, the tenure of the operator, and his capital-debt position affect the impact of acreage allotments on the individual farm. Another important factor is the range of enterprises adapted to his farm. The farm operator's choice may be limited by soil characteristics; amount, quality or cost of water; various pests, or location with respect to markets. The nature of the adjustment problem on individual farms in the Upper San Joaquin Valley is affected by all these considerations, and, therefore, it varies in seriousness among individual farms.

This Study Seeks Answers to Define the Degree and Seriousness of the Problem

We undertook first to establish the facts regarding the size and organization of cotton farms in the Upper San Joaquin Valley. Next, the analysis seeks to answer specific questions concerning farms of specified organization in three sizes: those including totals of 80 acres, 160 acres, and 320 acres of land, respectively.

Ultimately, this study sought to determine the impact of acreage allotments on farm earnings. The first step in this direction was to learn something of how farmers changed resource use under the program. A series of questions indicates the kind of information required to clarify this point. What was the actual cut in cotton acres? What crops did farmers plant on land released from cotton? How much land did they fallow or leave idle?

To what extent did the acreage allotments reduce the use of farm power and equipment? Did growers have to provide any additional equipment due to the changes they made in crops? Have the acreage allotment programs made certain equipment, such as cotton harvesters, uneconomic for some farmers?

How much more fertilizer did farmers apply to cotton after acreage allotments than before? Did they apply more irrigation water, and if so, how much? What about the amount and the timing for labor, power, machinery and other inputs?

These answers on resource use were highly important in measuring the impact of the allotment program on earnings. To measure the latter, it was necessary to compare total farm profits before and after allotments. The changes in cotton practices, yields, production and income were most important in determining how the total farm fared. The acreage and earnings of the substitute crops, and how they compared with cotton also had a bearing. Facts on cotton plus these other crops reveal the full impact of the acreage allotment program on total farm earnings.

The above indicates the primary objective of this study. Another objective was to answer questions regarding the overall pattern of farm resource use and technology. What specific land, equipment, irrigation facilities and capital investments do the various farm sizes include? What methods do growers use to produce cotton and the other crops, and how do they distribute the various inputs over the season? What are the costs for producing cotton and alternative crops,

and what is the importance of fixed and variable inputs in these costs? How do total costs and gross receipts and net returns vary among the several crops? We used the answers to this group of questions in reaching our primary objective. We also are making this information available in a separate report for the benefit of those concerned with such detailed technological data.[a]

The Analysis Employs Data From Farmers, Farm Suppliers, and Government Agencies

The facts for the analysis in this study came from a wide range of sources. Soil Survey Reports, Weather Bureau Releases and U. S. Reclamation Service Studies supplied information on the natural resource base for the Upper San Joaquin Valley. Information on farm size and organization came from the California State Agricultural Stabilization and Conservation Committee records, questionnaires returned by about a third of the cotton farmers in the Upper San Joaquin Valley, and statements by individual farmers. We found out from these sources the total farm acres, crop acres, and how farmers distributed their farm land among various crops. Farmer interviewees furnished most of the information regarding technology and production practices. In addition, the questionnaires supplied important evidence regarding fertilizing cotton practices.

The farmers who cooperated in the interviews also furnished the detailed information on their equipment and other inputs, and their detailed procedures in producing cotton and other crops. We called upon representatives of all agencies serving farmers in order to obtain price information for both 1953 and 1955.

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a/ Hedges, Trimble R., INPUTS AND COSTS FOR PRODUCING FIELD CROPS: 1. UPPER SAN JOAQUIN VALLEY COTTON FARMS, 1953-1955, Calif. Agric. Exp. Station, Giannini Foundation of Agricultural Economics Mimeo. Report No. 192.

This study determines and compares net farm returns before and after allotments by a detailed budgeting process. The budgets for the three farm sizes, 80, 160 and 320 total farm acres, represent two or more organizations for each size.

The first step in analysis was to determine the physical resources and investments and the annual costs for each capital item. We then determined total physical inputs according to the exact methods farmers used in producing cotton and the other crops. Third, we applied dollar and cent prices to these physical inputs and calculated production costs, including both the annual cost of the fixed capital and the expenses of variable inputs. Finally, the analysis determined, gross receipts and net returns per acre by crops, and for the total farm. The later portions of this report emphasize a comparison between such information for 1953 and 1955, and thus measure the impact of cotton acreage on the several size organization models.

COTTON DOMINATES CROP FARMING IN THE UPPER SAN JOAQUIN VALLEY

The Geographical Area Includes Most of the Irrigated Land in Kern County

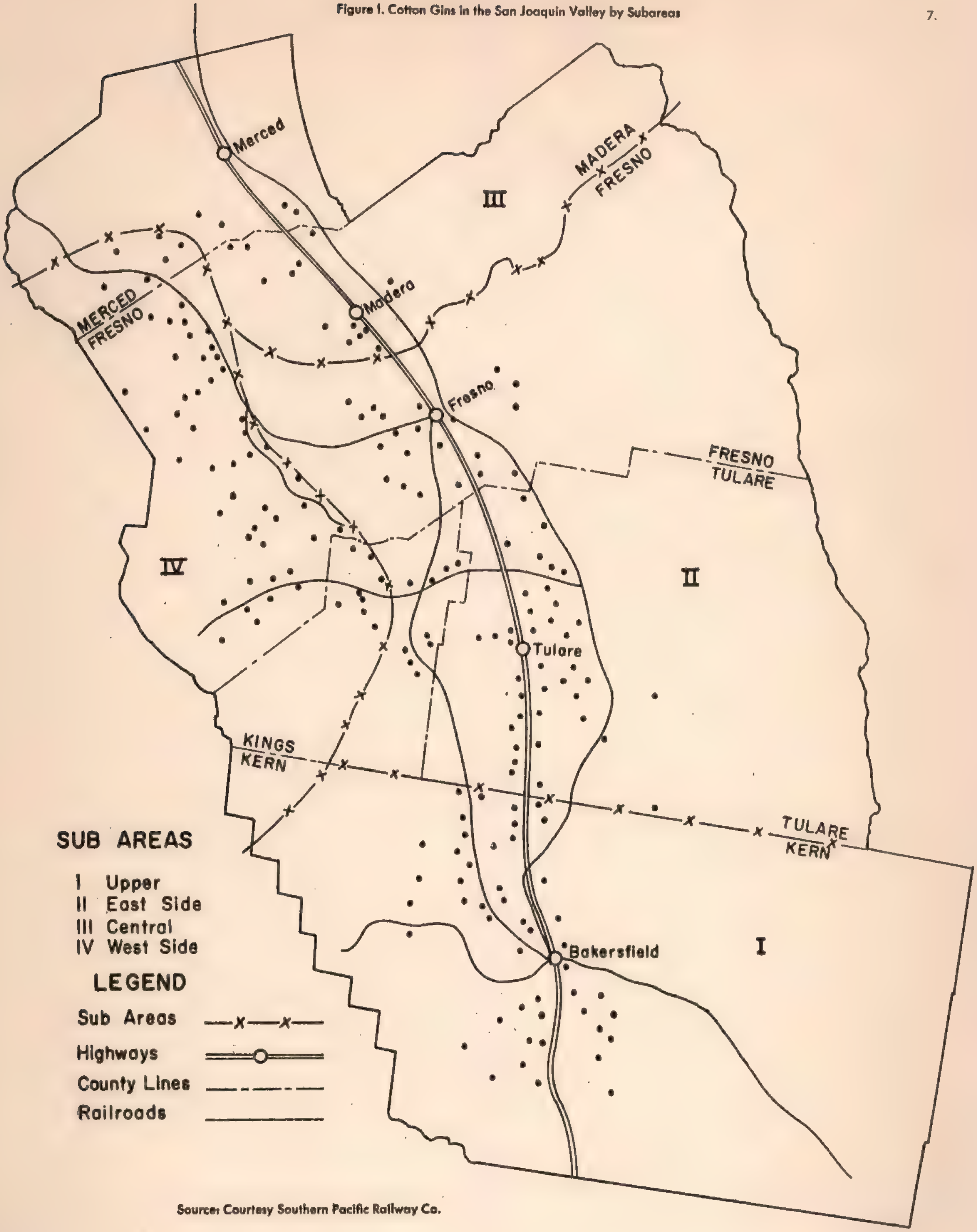
Kern County includes all of the upper San Joaquin Valley as defined in this study (Figure 1). This County is bounded on the East by the Sierra Nevada Range, on the South by the Tehachapi and by the foothills of the Coast Range on the West. The farming areas include the alluvial and basin soils in the central and northern parts of the County. Cotton is highly important on most irrigated land ranging from the Wheeler's Ridge area south of Bakersfield to the northern boundary just south of Delano (Figure 1). The heaviest concentration of cotton is south of Bakersfield and west of Highway 99 in the Shafter-Wasco-McFarland locality.

Cotton Increased in Importance Since World War II, Allotments Interrupt this Development

Cotton increased in absolute importance and as compared with all field crops and all agricultural products in Kern County between the early 1930's and the post-World War II period. (Figure II and Table 1)

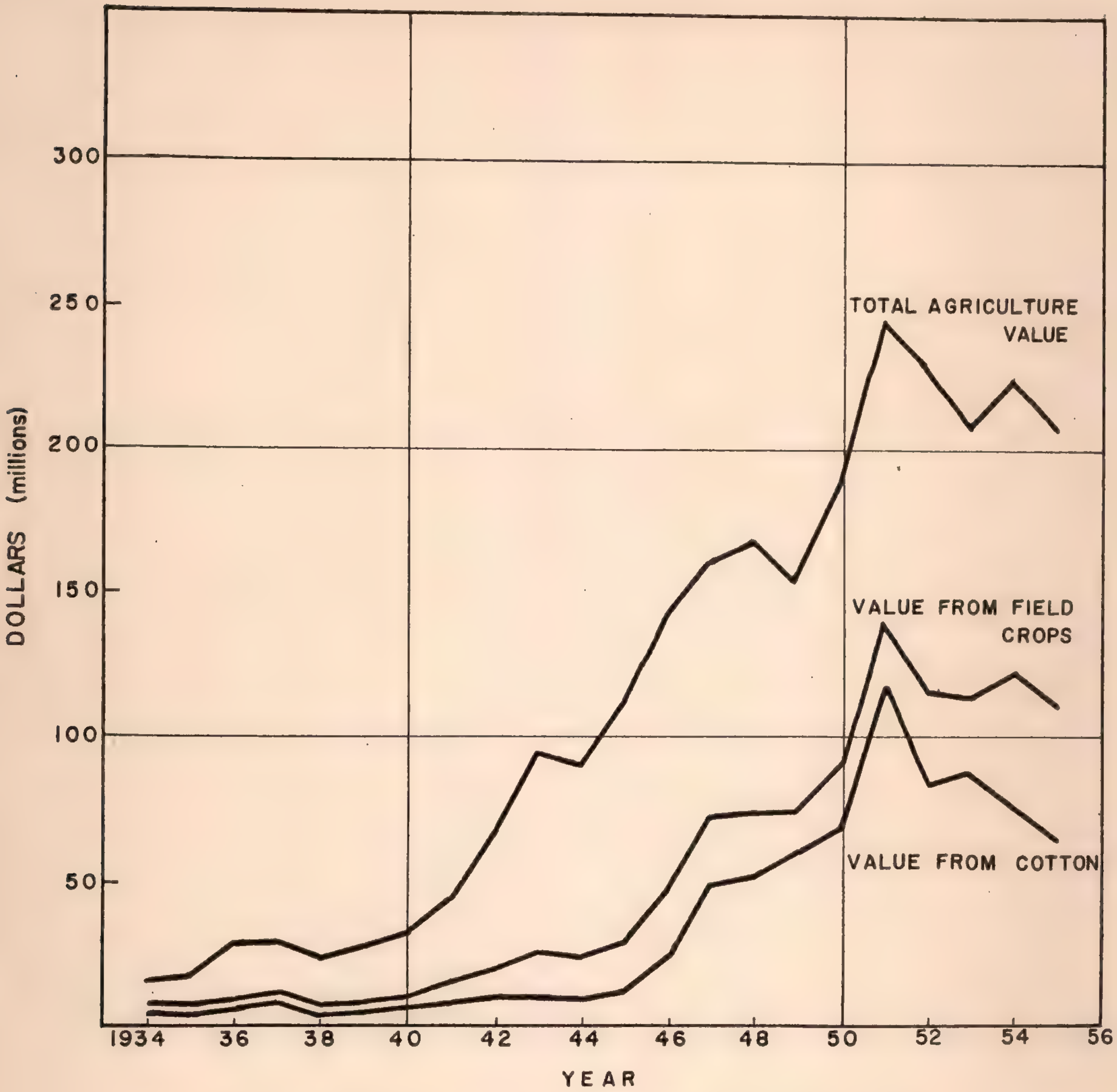
The War interrupted this tendency as did acreage allotments in the year 1950, and in the more recent years, 1954-1956. The total gross value of cotton during the five-year period, 1948-1949, 1951-1953, averaged over three-quarters the value of all field crop production, and 42 per cent of the value of all farm production (Table 1). Cotton acreage allotments were in effect during 1954 and cotton value represented 62 per cent of field crop value, 34 per cent of all farm value, respectively. The corresponding percentages for 1955 are 59 for cotton as a percentage of field crop value and 31 for cotton as a percentage of farm value.

Figure I. Cotton Gins in the San Joaquin Valley by Subareas



Source: Courtesy Southern Pacific Railway Co.

Figure II. Value from Agriculture, Field Crops, and Cotton; Upper San Joaquin Valley, 1934–1955



Cotton dominates field crop production and is of major importance in the total of agricultural production in the Upper San Joaquin Valley, except during World War II and when Government acreage allotments are in effect.

Field crops use most of the farm land in the upper San Joaquin Valley, and cotton is responsible for more than half the field crops when acreage allotments are not in effect (Table 1). The immediate impact of allotments on the aggregate use of crop land was to cut cutton from 57 per cent in 1953 to 35 per cent in 1954 and 31 per cent in 1955. Two facts are evident: Kern County farmers rank cotton above all other crops as a profit maker, and the acreage allotment program has resulted in cotton acreages sharply less than these farmers otherwise would have planted.

Table 1. Land Use and Value Produced for Cotton and Other Farm Products; Cotton Production and Value, 1937-1955; Upper San Joaquin Valley
(Physical quantities and dollars in thousands)

Item	1937 - 1941		1942 - 1946		1948 - 1949, 1951 - 1953		1953		1954		1955	
	acres or dollars	per cent	acres or dollars	per cent	acres or dollars	per cent	acres or dollars	per cent	acres or dollars	per cent	acres or dollars	per cent
	1	2	3	4	5	6	7	8	9	10	11	12
Land use												
Field crops	249	81	309	77	500	84	565	86	581	87	566	86
Other	58	19	95	23	93	16	94	14	86	13	95	14
All farmland	307	100	404	100	592	100	659	100	667	100	661	100
Cropland use												
Cotton	82	33	69	22	285	57	320	57	205	35	178	31
Other	167	67	240	78	215	43	245	43	375	65	388	69
All field crops	249	100	309	100	500	100	565	100	581	100	566	100
Value produced	$		$		$		$		$		$	
Cotton	7,304	23	13,780	13	79,742	40	87,110	42	75,802	34	64,636	31
Other field crops	4,366	14	15,828	16	23,891	12	26,167	13	45,650	20	45,329	22
Other sources	20,285	63	72,079	71	97,243	48	94,499	45	103,079	46	96,508	47
Total	31,955	100	101,688	100	200,876	100	207,775	100	224,530	100	206,473	100
Cotton versus all field crops	—	63	—	47	—	77	—	77	—	62	—	59
	1		2		3		4		5		6	
Cotton production												
Acres	82.20		69.40		284.60		320.00		205.40		177.80	
Yield a/	1.40		1.40		1.50		1.50		1.90		2.00	
Production b/	112.30		94.80		419.40		492.80		398.20		352.40	
Price per lb.	$ .14		$ .30		$ .40		$ .37		$ .40		$ .38	
Farm value	7,303.50		13,780.40		79,741.90		87,109.90		75,801.50		64,636.50	
Farm value in 1955 dollars	16,158.19		21,394.81		82,378.00		87,732.80		75,801.50			

a/ Bales/acre

b/ 1,000 bales

Source: Agricultural Crop Reports, Agricultural Commissioner, Kern County

LAND, CLIMATE, IRRIGATION WATER, AND PESTS ARE IMPORTANT TO FARMERS IN THE UPPER SAN JOAQUIN VALLEY

Soils are Highly Productive

Soil survey reports for the Bakersfield and Wasco Areas include practically all farm land producing cotton in the Upper San Joaquin Valley.[a] The physiographic soil groups in these areas include foothill or rolling land, old alluvial land, recent alluvial land and stream bottoms and basin areas. Some of the old alluvial lands are smooth, while others have "hog wallows"; the basin areas are gently sloping or flat. Most of the row crop production, particularly if it is cotton, is on the alluvial land; some is on basin soils. The soil survey reports rate and grade the various soil series and types in these two survey areas according to the Storie Index System.[b] Almost half of the land area in the Bakersfield and Wasco Survey Areas combined grades number one or two under the Storie Grading System (Table 2). Over half of the soils in the Bakersfield area and about a third of those in the Wasco area are in this group. The Hesperia and the Cajon series are the most important among the number one soils. The San Emigdio, entirely in the Bakersfield area, is the most important series in the grade two. It represents about a third of the total within grade two (Table 2). These are excellent soils, capable of yielding two bales or more of lint cotton per acre under proper management.[c] (A bale of lint cotton contains 478 pounds of cotton lint and weighs 500 pounds gross, including bagging and ties.)

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[a] Soil Survey Bakersfield Area, California; U.S.D.A. and University of California, Series 1937, No. 12, 1945, and Soil Survey, The Wasco Area of California; U.S.D.A. and University of California, Series 1936, No. 17, 1942.

[b] Storie, R. Earl, An Index For Rating The Agricultural Value of Soils, University of California Bulletin 556, September, 1933, June, 1937.

[c] McCorkle, C.O. Jr. and Mikkelsen, D.S., Nitrogen on California Cotton, National Fertilizer Review, January, February, March, 1954.

Table 2. Soils by Survey Areas and Grades; Upper San Joaquin Valley

Soil Classification		Bakersfield Area		Wasco Area		All Areas	
Grade	Series	Acres	Per cent of Area Total	Acres	Per cent of Area Total	Acres	Per cent By Grades
I.	Cajon	99,264	13.4	4,544	.9	103,808	37.5
	Hanford	192		13,568	2.6	13,760	5.0
	Hesperia	50,368	6.8	74,112	14.3	124,480	45.0
	Delano	11,456	1.5	17,024	3.3	28,480	10.3
	Greenfield			6,080	1.2	6,080	2.2
	Subtotal	161,280	21.7	115,328	22.3	276,608	100.0
	Per cent total	- -	- -	- -	- -	- -	22.0
II.	Adelanto	31,616	4.3	6,272	1.2	37,888	12.3
	Cajon	27,048	3.7	960	.2	28,608	9.3
	Chino	19,648	2.6			19,648	6.4
	Delano	1,536	.2	34,688	6.7	36,224	11.8
	Foster	40,704	5.5	704	.1	41,408	13.4
	San Emigdio	99,456	13.4			99,456	32.3
	Traver	36,800	5.0			36,800	12.0
	Chualar			2,112	.4	2,112	.7
	Ducor			3,392	.7	3,392	1.1
	Exeter			2,112	.4	2,112	.7
	Subtotal	257,408	34.7	50,240	9.7	307,648	100.0
	Per cent total	- -	- -	- -	- -	- -	24.4
III.	Adelanto	1,792	.2			1,792	.6
	Chino	3,520	.5	6,912	1.3	10,432	3.7
	Foster	1,536	.2			1,536	.5
	Hanford	3,584	.5			3,584	1.3
	Hesperia	4,032	.5			4,032	1.4
	Merced	33,984	4.6	50,176	9.7	84,160	29.5
	Milham	7,168	1.0	4,160	.8	11,328	4.0
	Panoche	18,816	2.5	9,280	1.8	28,096	9.8
	Sacramento	23,872	3.2			23,872	8.4
	San Emigdio	37,056	5.0			37,056	13.0
	Temple	9,408	1.3			9,408	3.3

(Continued on next page.)

Table 2 continued.

Soil Classification		Bakersfield Area		Wasco Area		All Areas	
Grade	Series	Acres	Per cent of Area Total	Acres	Per cent of Area Total	Acres	Per cent By Grades
III. (cont'd)	Traver	8,064	1.1	46,208	8.9	54,272	19.0
	Exeter			2,048	.4	2,048	.7
	Madera			6,912	1.3	6,912	2.4
	Tujunga			512	.1	512	.2
	Tulare			3,392	.7	3,392	1.2
	Delano			2,816	.6	2,816	1.0
	Subtotal	152,832	20.6	132,416	25.6	285,248	100.0
	Per cent total	- -	- -	- -	- -	- -	22.6
IV.		40,896	5.5	85,824	16.6	126,720	
V.		43,136	5.8	39,296	7.6	82,432	
VI.		86,848	11.7	94,016	18.2	180,864	
	Subtotal	170,880	23.0	219,136	42.4	390,016	
	Per cent total	- -	- -	- -	- -	- -	31.0
	Total land	742,400	100.0	517,120	100.0	1,259,520	100.0

Source: Computed from Soil Survey Reports for the Bakersfield and Wasco Areas.

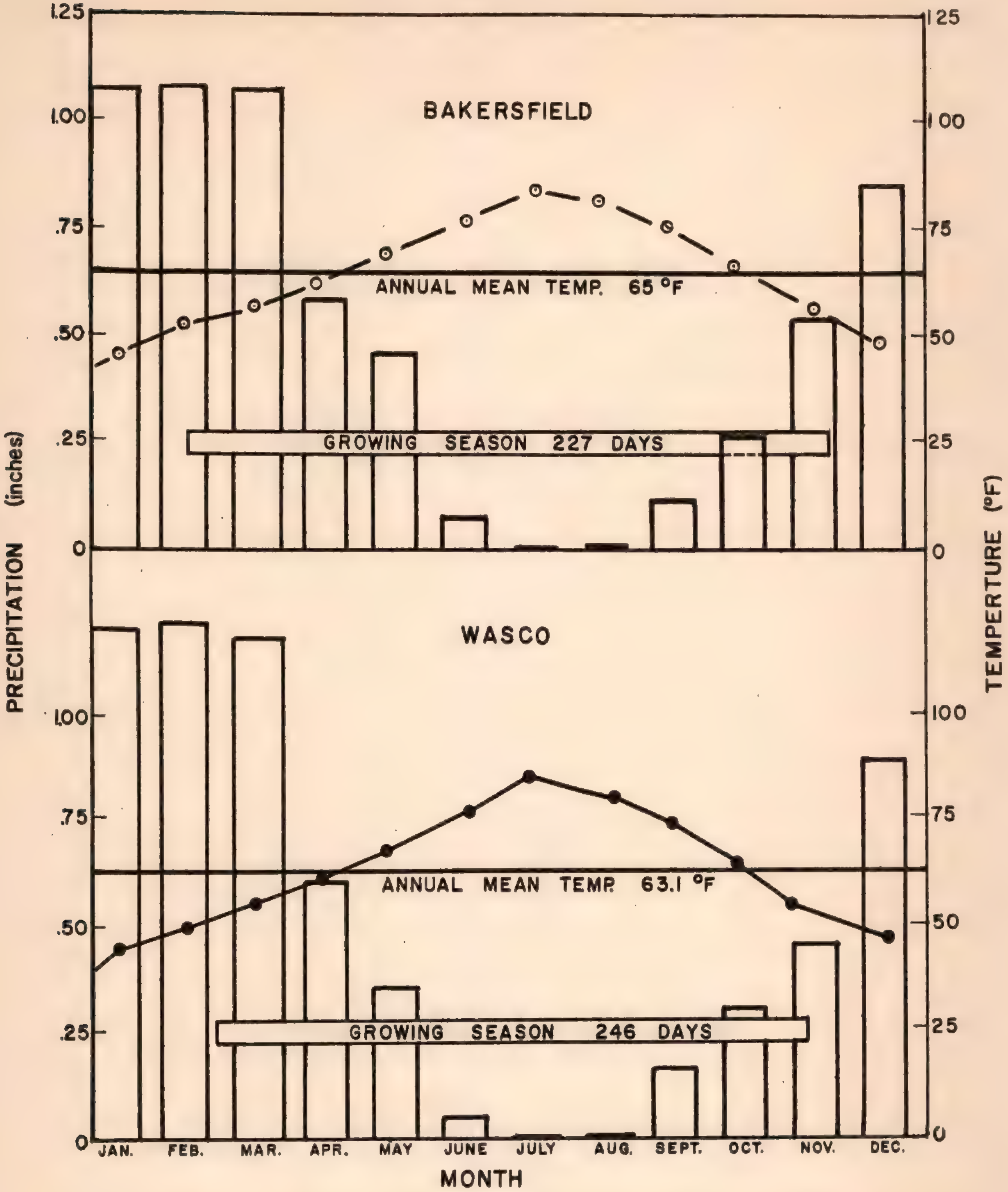
The grade three soils for the two survey areas combined include 23 per cent of the total for all soils studied. The Merced, Traver, and San Emigdio are the three most important series in this grade. These soils, too, are capable of producing satisfactory yields, (though not as high as yields on the grade 2 soils) but require more careful management.

Seventeen of the 32 farmers who furnished detailed survey data reported grade one as their main soil body; grade three was the chief soil for another seven. This means that slightly over half of the growers reported grade one and another fifth reported grade three as the most important soil grade on their farms. Among the various series, the Hesperia, Cajon, Traver and Merced were most frequently reported by the interviewees.

Climate is Favorable for Summer Crops if Adequate Irrigation Water is Available

The main valley farming land in the Upper San Joaquin Valley enjoys a highly favorable growing season, but gets little rain. The annual mean temperature at both Bakersfield and Wasco is 65°F. (Figure III). The monthly averages range from the low forties in December and January to the mid-eighties in July. Daily maximi during the summer months often are above a hundred degrees with the extreme record at 118°F. The minimi seldom are below 30 during the winter months, but the record low is 12°F. for Wasco. Growing seasons in the Upper San Joaquin Valley range from 8 to 9 months in length. The most critical climatic characteristic is the shortage of rainfall, the annual average being about 6 inches in most of the area. Irrigation, therefore, is essential for summer crops. The grower who expects to profit from producing cotton, or practically any other crop, must have available adequate supplies of satisfactory quality water at reasonable costs.

Figure III. Precipitation, Temperatures, and Growing Seasons; Bakersfield and Wasco[1]



The upper San Joaquin Valley has scant rainfall, hot summers, and a long growing season. Irrigation is required for summer crops.

[1] Sources: Climatological Data, U. S. Weather Bureau; Period averages: Precipitation—Bakersfield 40, Wasco 39 years; Temperatures—Bakersfield 49, Wasco 53 years.

Consumptive Use Presses Against Irrigation Water Supply

Farmers in the Upper San Joaquin Valley operated about 600,000 acres of land in crops during 1955. (Table 1) This indicates total water requirements of 1,500,000 acre feet or more, according to available information on current irrigation practices in this area. Water to supply these needs comes from rainfall, underground reservoirs, streams and the Friant-Kern Canal. The six inches of annual rainfall, coming mostly between November and May, represents a small fraction of the total crops' requirements. Practically all summer crops depend heavily on irrigation for satisfactory yields, usually for virtually all water they use.

The Kern River with a mean flow near Bakersfield of 716,000 acre feet is the principal source of stream water coming into the San Joaquin Valley.[a] The Friant-Kern Canal also brings water from the Friant Lake for use in Kern County. This is one of the facilities of the Central Valley Project. The water is available under contract, and in compliance with the relevant statutes and policies of the U.S. Government.

As suggested by the above data, farmers during recent years, have used more underground water than flows back for recharge. This practice has had the inevitable result; the water table has lowered, thus, increasing the distance to lift the water to ground-level. Bureau of Reclamation calculations, based on California Division of Water Resources data, gives some idea of how seriously water tables dropped from 1921 to 1948.[b]

These data for the Shafter-Wasco Irrigation District indicate that during these years the water level fell by amounts ranging from 20 feet at the southwestern corner to 160 feet at the northeastern corner of the District. A range

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[a] Shafter-Wasco Irrigation District Technical studies, U.S. Department of Interior, Bureau of Reclamation, 1952.

[b] *Ibid.*

of 50 to 80 foot drop included much of the more productive and intensively farmed land in the District.[a]

The only way to offset such depletion of ground-water resources under current use levels is to bring in additional water from outside the natural drainage areas. The Technical Studies for this irrigation district indicates that a total of 69,000 acre feet of supplemental water will meet estimated needs of the Shafter-Wasco Irrigation District. This total is to include 50,000 acre feet of dependable supply and 19,000 of variable supply per year.

Another proposal for using Friant-Kern water for supplementing local supplies involves the Arvin-Edison Water Storage District. This idea, if it matures into a working program, might bring as much as 208,800 acre feet of canal water into the Upper San Joaquin Valley, including 40,000 per year of dependable supply, and an average of 168,800 acre feet per year of variable supply.

Actually, the Friant-Kern Canal already is an important factor in checking the depletion of underground water supplies in the Upper San Joaquin Valley. We estimate from data furnished by the Bureau of Reclamation that this source supplied approximately 114,000 and 134,000 acre feet of water in 1954 and 1955, respectively.

Both canals and wells supply irrigation water in the Upper San Joaquin Valley. All of the flow of the Kern River that reaches the farming areas is diverted into canals. The Kern County Land and Cattle Company control and distribute much of this water. The Lerdo and Calloway Canals service the north Kern County Water storage district north of Bakersfield and east of the Shafter-Wasco Irrigation District. Various other canals carry water west, south and east of Bakersfield. Farmers interviewed in this study indicated an average pumping lift of 200 feet for irrigation water pumped in 1955. The depth to

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[a] Shafter-Wasco Irrigation District Technical studies, U.S. Department of Interior, Bureau of Reclamation, 1952.

water and the lift are much greater for certain operations in the Wheeler's Ridge Region, south of Bakersfield.

Water shortages and high water costs are serious problems in the Upper San Joaquin Valley. The rates of use relative to replacement and the tendency toward lowered water tables define the nature of the farmer's problem; diminishing supplies and increasing costs. Moves already made or in progress for the purpose of importing water will help alleviate this problem. They are not yet of sufficient scope to solve it completely.

Weeds, Insects and Diseases Increase Production Costs

The Bureau of Reclamation, Weed Survey identified 51 different species of weeds in the Shafter-Wasco Irrigation District in July, 1948. Due to the timing of the study, many annual weeds that appear in earlier months were not present. This survey indicated that the primary noxious weeds are nut grass, white horse nettle, and Johnson grass. Russian knapweed and camel thorn also were present.[a]

The area is affected in varying degrees by approximately 51 different species of weeds, the more important of which are listed as follows:

Primary noxious weeds:	
White horse nettle	(Solanum elaeagnifolium)
Russian knapweed	(Centaurea repens)
Camel thorn	(Alhagi camelorum)
Secondary noxious weeds:	
Alkali mallow	(Sida Hederacea)
Bermuda grass	(Cynodon Dactylon)
Johnson grass	(Holcus holepensis)
Nutgrass	(Cyperus esculentus)
Puncture vine	(Tribulus terrestris)
Sandbur grass	(Cenchrus pauciflorus)
Wild morning glory	(Convolvulus arvensis)
Pignut	(Hoffmanseggia densiflora)
Other weeds of economic importance:	
Watergrass	(Echinochloa crusgalli)
Lambsquarter	(Chenopodium album)
Russian Thistle	(Salsola kali)
Rough pigweed	(Amaranthus retroflexus)

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[a] Shafter-Wasco Irrigation District Technical studies, U.S. Department of Interior, Bureau of Reclamation, 1952.

McCorkle and Hedges in an earlier report discussed insect and disease damage.[a] Lygus Bugs in cotton and tuber moths in potatoes are damaging insects requiring control measures, and therefore increasing production costs. Among diseases, vertcillium wilt in cotton and two fungus diseases, scab and leak, in potatoes also are cost-increasing pests. These examples merely suggest some types of pest problems, and how they increase production costs. Many other crops that farmers may consider as alternatives for these two principal crops also have their pest problems. Certain varieties of safflower, for example, are handicapped due to root-rot. Furthermore, the situation regarding pests is continually changing. New enemies arise to plague some of the established crops.

The spotted alfalfa aphid sprang into prominence during 1955 as a yield-reducing or cost-increasing factor in alfalfa production.

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[a] McCorkle, C.O., Jr. and T.R. Hedges, Northern Kern County Cotton-Potato Farms, University of California, October, 1952, Giannini Foundation Mimeographed Report No. 137, the first report in a series on Organization, Inputs and Costs.

ACREAGE ALLOTMENTS CAUSED FARMERS TO USE LAND LESS INTENSIVELY AND TO REDUCE TOTAL FARM PRODUCTION

Land is a major resource of cotton growers in the Upper San Joaquin Valley. Our first step in this study, therefore, was to identify and measure changes in land use accompanying the 1954 and 1955 cotton acreage allotment programs. Later sections will examine changes in use of water, capital, labor and other resources. It is helpful now to pose certain critical questions involved in analyzing changes in land use. "What are the sizes of farming units, and what are their relative numbers?" "How is the total farm land divided among these various farm sizes and farm operators?" "How did the farm operators use the land prior to allotment?" "How did they change their pattern of farm land use under allotments?"

Factual answers to these inquiries will indicate in large degree the effect of cotton acreage allotment on land used in the Upper San Joaquin Valley. Such answers are not completely accurate regarding the effects of cotton acreage allotments because not all the changes are due entirely to acreage allotments; other forces have been and are at work to affect farmers' decisions in how they will use their land. We believe, however, that the acreage allotment program was, with one important exception, the major factor associated with changes in the cropping pattern from 1953 to 1954 and 1955. Growers reduced their acreage of early potatoes in 1954 as a direct result of low prices and losses in 1953. Any estimate of the net effects of cotton allotments must recognize this additional influence.

There may have been other less obvious forces also involved in farmers' land use decisions. This analysis does not attempt to identify and measure the influence of such forces. Such analysis, though desirable, must come in later investigations.

Small Farms in Greater Number, But Large Ones Include Most of the Land

This study drew on California State Agricultural Stabilization and Conservation Committee data to establish facts on farms and land use.[a] The classification for the 1867 allotment holders in 1954 places the 40, 80, 160, and 320 acres of cropland sizes in the middle of the class intervals, according to cropland (Table 3). All farms of 20 acres of cropland or less are in a single interval. The farms larger than the "320-acre farms" are classified into three groups. The "160-acre size" includes 402 farms, the largest number of any group. Other than this group and those centering about 320 acres, the number of farms in each interval was largest for the smallest size, and decreased with each succeeding larger size up to the largest operations. This last class, farms of 1,100 acres or more, included 84 farms (Table 3).

The distribution of cropland and cotton acres was roughly inverse to the number of farms. The largest total number of acres was in the largest farms, and the smallest in those of 20 acres or less. Later analysis deals with three farm sizes, those centering on 80, 160, and 320 acres of cropland.

Farms in the two largest-sized groups included 61 per cent of the cropland and 54 per cent of the cotton in 1953. There was a tendency for the percentage of cropland in cotton to diminish with increased size of farm. The three farm sizes from 80 to 320 acres operated about 65 per cent of their cropland in cotton in 1953. This percentage diminished to about 60 per cent for the 661-1,100 acre group and to 44 per cent for the largest farms (Table 3).

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a/ We summarized information for 1867 allotment holders in 1954 to determine crop acres, historical cotton acreage data, and the 1954 allotments. The State Committee authorized us to use these data in aggregates and as groups, without revealing information regarding individual operations.

Table 3. Farm Size, Total Cotton Acres, and Acres Diverted 1954 and 1955: Upper San Joaquin Valley

Cropland acres class intervals	Number of farms	Average acres per farm	Total acres for all farms Cropland	Total cotton acres				Diverted acres	
				3-year average acres 1951-1953	acres 1953	final allotment 1954	acres planted 1955 a/	3-year average to 1954	3-year average to 1955
1	2	3	4	5	6	7	8	9	10
		acres							
1 - 20	369	11.9	4,392	2,918	2,923	3,710	3,151	792	233
21 - 60	347	39.2	13,587	9,441	8,951	6,375	5,429	-3,066	-4,012
61 - 100	226	79.2	17,903	12,665	12,551	7,880	6,711	-4,785	-5,954
101 - 220	402	150.7	60,574	40,857	40,218	26,169	22,268	-14,688	-18,589
221 - 420	245	300.8	73,695	47,602	47,357	30,477	25,952	-17,125	-21,650
421 - 660	108	525.4	56,745	35,459	35,455	23,165	19,722	-12,294	-15,737
661 - 1,100	86	828.8	71,273	42,100	43,318	27,499	23,407	-14,601	-18,693
1,100 + above	84	3475.5	291,939	123,337	130,045	83,833	71,360	-39,504	-51,977
Total	1867	316.1	590,108	314,379	320,818	209,108	178,000	-105,271	-136,379

a/ Estimated.

Source: California Agricultural Stabilization and Conservation Committee.

Acreage allotments in 1954 and 1955 brought drastic cuts in cotton; the total final allotment in 1954 was 65 per cent of the 1953 acreage, while the estimated 1955 acreage planted represented 55 per cent of 1953 acres. Reduction for farms in the various sized groups were similar percentagewise to those for the area as a whole except for the smallest farms. The allotment regulations imposed no cuts for farms with five acres or less of cotton in the base period and permitted less than the average cut for farms up to fifteen acres of cotton. It is for this reason that the allotments and estimated planted acreage for farms of the two smaller farm sizes show slight increases in cotton for 1954 and 1955.

Cotton Farms are Cash Crop Farms and Cotton is the Chief Crop

Nearly 500 farmers in the Upper San Joaquin Valley returned questionnaire cards providing information on their 1953 and 1954 land use pattern and cropping systems.[a]

These same farm acreage and land use data, when expressed as averages, provide a more clear-cut picture of the pre- and post-allotment conditions on individual farms. The three analysis farms of 80, 160, and 320 cropland acres had 74, 70, and 67 per cent, respectively, of their total cropland in cotton during 1953 (Table 4). The 1953 acreage represented some gain over the 1951-1953 average percentage, but it was only slight. Certainly cotton was the dominant crop on these farms prior to the allotment programs, and this status was well-established. It had existed during the entire period following 1950, the last time before 1954 that allotments were in effect. Farmers therefore must

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[a] This represents about 26 per cent returns of useable questionnaires. Besides these useable returns, we discarded a number of cards for errors or incomplete information. The California Agricultural Extension Service, Kern County Office, cooperated in this questionnaire survey and their assistance was very effective in making it successful.

have adjusted their plans and resources to cotton as the crop occupying most of their irrigated land.

The post-allotment cotton acreages reflect the percentage cuts indicated above. The actual acres involved, by size of farms, ranged from 21 to 70 in 1954, and from 26 to 88 in 1955 for the three analysis sizes (Table 4).

The tendency for decreases in the relative importance of cotton in the cropping and farm organization as the size of the operation increases is evident for the analysis farm sizes. This tendency continues consistently as farm size increases to the 1,100-acres-and-over operations. This group of largest sized farming units averaged 60 per cent of the crop land in cotton during 1953 (Table 4). The 84 farms in this size class are definitely large-scale operations. They averaged 1548 acres in cotton during 1953, nearly 1,000 following the 1954 allotments, and 850 in 1955. The analysis in this report makes no attempt to evaluate the economic effects of allotments on farms of this size. Such an analysis of large-scale cotton farms will appear in a subsequent report dealing with cotton allotments and farm adjustments in the western San Joaquin Valley.

The net crop acres per farm for the various cropland class intervals of the questionnaire sample compare quite closely with the data from the complete listing of 1900 farms (Tables 3 and 5). The chief difference among comparable classes is in the smallest farm size class; possibly the small number of questionnaires returned by operators in the class explains this discrepancy. The largest size classes for the two sets of data are not directly comparable. The largest sized group for the questionnaire returns includes one cropland interval shown separately in the complete ASC listing.

It is extremely helpful to be able to match the two sets of data in this manner. The questionnaires include a great deal more detail than the listing

Table 4. Farm Size, Average Cotton Acres, and Acres Diverted 1954 and 1955: Upper San Joaquin Valley

Cropland class intervals	Number of farms	Average per farm	Total acres for all farms Cropland	Average cotton acres				Diverted acres	
				3-year average/F 1951-1953	1953/F	final allotment 1954/F	acres planted/F 1955 a/	3-year average/F to 1954	3-year average/F to 1955
1	2	3	4	5	6	7	8	9	10
		acres							
1 - 20	369	11.9	4,392	7.9	10.1	10.1	8.5	2.1	0.6
21 - 60	347	39.2	13,587	27.2	28.3	18.4	15.6	-8.8	-11.6
61 - 100	226	79.2	17,903	56.0	58.6	34.9	29.7	-21.2	-26.3
101 - 220	402	150.7	60,574	101.6	105.8	65.1	55.4	-36.5	-46.2
221 - 420	245	300.8	73,695	194.3	202.4	124.4	105.9	-69.9	-88.4
421 - 660	108	525.4	56,745	328.3	337.7	214.5	182.6	-113.8	-145.7
661 - 1,100	86	828.8	71,273	489.5	503.7	319.8	272.2	-169.8	-217.4
1,100 + above	84	3475.5	291,939	1468.3	1548.2	998.0	849.5	-470.3	-618.8
Total	1,867	316.1	590,108	168.4	187.8	112.0	95.3	-56.4	-73.0

a/ Estimated.

Source: California Agricultural Stabilization and Conservation Committee.

Table 5. Land Use on Cotton Farms, 1953-1955: Upper San Joaquin Valley

Cropland class intervals	Mid-point	Number or farms	Net crop acres		Fruit		Noncultivated		Total farm	
			total	average	number reporting	total acres	number reporting	total acres	total acres	average acres
1	2	3	4	5	6	7	8	9	10	11
1 - 20	10	36	546	15.2	5	223	5	28	797	22.1
21 - 60	40	81	3,294	40.7	5	34	21	117	3,445	42.5
61 - 100	80	64	5,017	78.4	5	301	11	158	5,476	85.6
101 - 140	160	127	19,037	149.9	12	1,829	33	1,492	22,358	176.0
141 - 180										
181 - 220										
221 - 260	320	79	24,226	306.7	10	887	16	1,729	26,842	339.8
261 - 300										
301 - 340										
341 - 420										
421 - 500	540	39	21,093	540.8	7	879	9	790	22,762	583.6
501 - 580										
581 - 660										
661 - 10,000 and over		68	178,232	2621.1	9	4,871	24	14,429	197,532	2904.9
Total		494	251,445	509.0	53	9,024	119	18,743	279,212	565.2

Source: Questionnaire returns, 1954.

Table 6. Total and Average Acres per Farm: Fruits, Grapes and Noncultivated Lands, 1954, Upper San Joaquin Valley

Cropland class interval	Mid-point	Number of farms	Mature tree fruit			Mature grapes			Other fruit			Noncultivated		
			farms reporting	acres		farms reporting	acres		farms reporting	acres		farms reporting	acres	
				total	per farm		total	per farm		total	per farm		total	per farm
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 - 20	10	36	3	25	8.3	2	198	99.0	-	-	-	5	28	5.6
21 - 60	40	81	2	4	2.0	1	5	5.0	2	25	12.5	21	117	5.6
61 - 100	80	64	-	-	-	5	301	60.2	-	-	-	11	158	14.4
101 - 140 141 - 180 181 - 220	160	127	4	15	3.8	7	1,804	257.7	1	10	10.0	33	1,492	45.2
221 - 260 261 - 300 301 - 340 341 - 420	320	79	4	56	14.0	3	390	130.0	3	441	147.0	16	1,729	108.1
421 - 500 501 - 580 581 - 660	540	39	2	20	10.0	5	859	171.8	-	-	-	9	790	87.8
661 - 10,000 and over		68	3	130	43.3	5	4,739	947.8	1	2	2.0	24	14,429	601.2
Total		494	18	250	13.9	28	8,296	296.3	7	478	68.3	119	18,743	157.5

Source: Questionnaire returns, 1954.

sheet data, though from only about one-fourth as many farms. The questionnaires list non-open crop acres by major uses, and the total land in the farm, as well as the actual open crop acres indicated on the ASC listing sheets. They also show crops other than cotton and the acres in each for 1953 and 1954; thus, they provide evidence as to the use farmers made of the land that they diverted from cotton under the allotment programs.

Over 90 per cent of the total farm land is classified as crop acres, on farms whose operators returned questionnaires. It is evident that the farms in the Upper San Joaquin Valley that do produce cotton are primarily field crop farms.

It is further evident that fruit is relatively unimportant on these farms, for a total of 53 farmers reported only 9,000 acres of fruit, of which 8,300 are in grapes (Tables 5 and 6). This conclusion is corroborated by the cotton acreage data reported by these farmers. The percentage of total cropland in cotton is quite similar for the questionnaire sample and the ASC total listing.[a]

Diverted Acres Used Mainly for Feed Grains, or Left Fallow

The 1954 cotton acreage allotments for Upper San Joaquin Valley farmers returning questionnaires represented a cut of nearly 50,000 acres from 1953 cotton acres (Table 7). In addition, these growers reduced potato acreage heavily in 1954, compared with 1953. California state totals for the two years indicate a 27,000 acre drop in early potatoes, of which the bulk was in Kern County. Data are not available to show how much of this reduction occurred on the operations of farmers returning questionnaires. The questionnaire returns

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[a] It is necessary to consider the relatively higher proportion of questionnaire returns for large operations when analyzing the proportion total cotton acreages of cropland. The percentage return was 26.4 for the entire sample and 38.2 for the two larger farm size classes.

Table 7. Cotton Acreage in 1953, 1954, and 1955; on Cotton Farms Returning Questionnaire, Upper San Joaquin Valley

Cropland class intervals	Average acres per farm	Number of farms	1953 Acres		1954 Acres		1955 a/ Acres		Change in acreage	
			total	average	total	average	total	average	1953 to 1954	1954 to 1955
1	2	3	4	5	6	7	8	9	10	11
1 - 20	15.2	36	410	11.4	404	11.2	345	9.6	-6	-59
21 - 60	40.7	81	2,393	29.5	1,613	19.9	1,385	17.1	-780	-228
61 - 100	78.4	64	3,895	60.9	2,451	38.3	2,105	32.9	-1,444	-346
101 - 140 141 - 180 181 - 220	149.9	127	12,997	102.3	8,631	68.0	7,409	58.3	-4,366	-1,222
221 - 260 261 - 300 301 - 340 341 - 420	306.7	79	17,384	220.0	10,689	135.3	9,177	116.2	-6,695	-1,512
421 - 500 501 - 580 581 - 660	540.8	39	13,579	348.2	8,849	226.9	7,593	194.7	-4,730	-1,256
661 - 10,000 and over	2621.1	68	88,415	1300.2	56,525	831.2	48,526	713.6	-31,890	-7,999
Total	509.0	494	139,073	281.5	89,162	180.9	76,540	155.3	-49,911	-12,622

a/ Estimated

Source: Questionnaire returns, 1954.

do indicate, however, that these operators made sharp reductions in potatoes or in the "other crops" category. They cut "other crops" by 5,000 acres between the two seasons (Table 8). Farms in the largest size class reduced other crops more than this amount, but small increases on the smaller farms offset a part of their reduction.

Grain increased the most in the Upper San Joaquin Valley from 1953 to 1954, a total of 40,000 acres. Acreage gains by crops included barley 13,000, milo 15,000, and corn 12,000, respectively (Table 8). As indicated above, growers cut their acreage in other crops by about 5,000 acres; they increased fallowed land by over 17,000 acres.

Among the smaller farm size classes, the biggest proportional change in acreage occurred in barley and in field corn. Operators in the largest size class already were producing a sizeable acreage of barley. They planted more of this crop, and expanded sharply in milo and corn. This latter group of farmers cut their acreage of other crops by one-fifth, but quadrupled their acres fallowed (Table 8).

Changes in the numbers of growers producing the various crops are as important as the acreage shifts. The number of barley growers more than quadrupled, due to new recruits among farmers on the smaller units. Milo producers increased in 1954 (Table 7), to about nine times their 1953 numbers, while corn growers multiplied by over eight times. The growers of other crops increased slightly and the number of operations with some land in fallow increased by almost 90 per cent.

Data are not available to pinpoint the exact numbers, but it appears from California acreage totals that both acres and growers of corn and milo increased further in 1955 over 1954, but declined in 1956. The Upper San Joaquin Valley is one of the more important California corn-growing areas as a result of the 1953-1955 acreage expansion.

Table 8. Crops other than Cotton in 1953 and 1954 on Cotton Farms Returning Questionnaires: Upper San Joaquin Valley

Cropland class interval	Average acres per farm	Number farms	Alfalfa			Irrigated pasture			Barley		
			farms reporting	acres		farms reporting	acres		farms reporting	acres	
				total	average		total	average		total	average
1	2	3	4	5	6	7	8	9	10	11	12
1953											
1- 20	15.2	36	5	42	8.4	5	17	3.4	1	2	2.0
21- 60	40.7	81	28	441	15.8	11	47	4.3	7	69	9.8
61- 100	78.4	64	23	601	26.1	3	30	10.0	2	25	12.5
101- 140	149.9	127	60	3,299	55.0	18	318	17.7	11	372	33.8
141- 180											
181- 220											
221- 260	306.7	79	37	3,681	99.5	15	469	31.3	4	199	49.8
261- 300											
301- 340											
341- 420											
421- 500	540.8	39	16	2,289	143.1	7	129	18.4	5	655	131.0
501- 580											
581- 660											
661-10,000 and over	2621.1	68	32	20,249	632.8	16	11,014	688.4	7	13,593	1941.9
Total	509.0	494	201	30,602	152.2	75	12,024	160.3	37	14,915	403.1
1954											
1- 20	15.2	36	4	33	8.2	4	8	2.0	4	12	3.0
21- 60	44.9	81	38	653	17.2	10	50	5.0	24	319	13.3
61- 100	81.2	64	28	895	32.0	5	39	7.8	22	503	22.9
101- 220	152.7	127	72	3,790	52.6	19	359	18.9	34	1,312	38.6
221- 420	302.4	79	39	3,594	92.2	17	628	36.9	26	1,847	71.0
421- 660	541.7	39	16	2,682	167.6	6	96	16.0	17	2,331	137.1
661-10,000 and over	2657.2	68	38	22,617	595.2	21	7,687	366.0	40	33,462	836.6
Total	515.1	494	235	34,264	145.8	82	8,867	108.1	167	39,786	238.2

(Continued on next page.)

Table 8 continued.

Milo			Field corn			Other crops			Fallow		
farms reporting	acres		farms reporting	acres		farms reporting	acres		farms reporting	acres	
	total	per farm		total	per farm		total	average		total	average
13	14	15	16	17	18	19	20	21	22	23	24
1953											
						5	59	11.8	8	19	2.4
10	109	10.9	1	12	12.0	8	163	20.4	21	122	5.8
9	150	16.7	1	5	5.0	9	203	22.6	11	206	18.7
13	522	40.2	3	85	28.3	25	986	39.4	43	1,002	23.3
6	255	42.5	3	110	36.7	21	1,856	88.4	27	1,393	51.6
2	140	70.0	2	125	62.5	20	3,128	156.4	13	1,108	85.2
4	996	249.0	6	243	40.5	33	48,216	1461.1	22	3,944	179.3
44	2,072	47.1	16	580	36.2	121	54,611	451.3	145	7,794	53.8
1954											
4	11	2.8	4	14	3.5	3	14	4.7	14	58	4.1
19	239	12.6	17	172	10.1	10	128	12.8	35	291	8.3
17	401	23.6	19	415	21.8	14	339	24.2	30	437	14.6
32	1,235	38.6	31	1,221	39.4	30	1,311	43.7	80	2,032	25.4
17	807	47.5	26	1,354	52.1	31	2,711	87.4	42	2,552	60.8
10	770	77.0	12	1,056	88.0	23	3,242	141.0	30	2,532	84.4
15	13,854	923.6	27	8,265	306.1	37	22,147	598.6	40	17,435	435.9
114	17,317	151.9	136	12,497	91.9	148	29,892	202.0	271	25,337	93.5

FARMERS OPERATING 80-ACRE UNITS FOUND SUBSTITUTE CROPS DECIDEDLY LESS PROFITABLE THAN COTTON, BUT HIGHER COTTON YIELDS AND PRICES LARGELY OFFSET THE IMPACT OF REDUCED ACRES IN 1955. POTATO PRICES AND PROFITS ALSO WERE HIGHER IN 1955 THAN IN 1953.

This is the first of three sections analyzing in detail the impact of cotton acreage allotments on farm resources and earnings. Data and analysis presented here relate to the 80-acre farm organizations in the Upper San Joaquin Valley. Interviewees furnished most of the detailed information used to analyze these three 80-acre models. In the Upper San Joaquin Valley the 80-acre farms included about 12 per cent of the total number of cotton farmers with 1954 acreage allotments. This is the smallest size that can provide full-time employment for a farm family producing cash crops under the conditions prevailing at the time of this study.[a]

All Three 80-acre Farming Units Shifted to Less Intensive Land Use

The three 80-acre farm models include two with reasonably adequate irrigation water, the 80-1 cotton-alfalfa, and the 80-2 cotton-potato farms. The 80-3 cotton-barley farms have limited water supplies. The latter farm also is on less productive soils than the first two; grade 3 soils are typical of the cotton-barley unit. The 80-1 farm almost doubled its alfalfa acreage while adding barley in 1954 and milo in 1955 (double cropped) as it reduced cotton acres (Table 9). The farmers operating the 80-2 farms produce both potatoes and cotton, but could not shift acres diverted from cotton into potatoes. Actually

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[a] Two smaller units in terms of crop acres included a total of 38% of all allotment holders in Kern County during 1954. These were the allotment holders with 20 crop acres or less, 369 or 19.3%, and those with 21 to 60 acres of cropland, 347 or 18.2% of all allotment holders. We selected the 80-acre farm as the smallest size to analyze because we are concerned in this study with farms that represent an economic unit for family operation.

Table 9. Crops and Land Use on Typical 80 Acre Farms, 1953-1955; 80-1, Cotton-Alfalfa; 80-2, Cotton-Potato; 80-3, Cotton-Barley, in Upper San Joaquin Valley

Year 1	Cotton 2	Alfalfa 3	Potatoes 4	Barley 5	Field corn 6	Milo 7	Double crop 8	Total crop-land 9	Non culti-vated 10	Total land 11
80-1										
1953	60	17	--	--	--	--	--	77	3	80
1954	40	25	--	12	--	--	--	77	3	80
1955	33	30	--	14	--	14	14	77	3	80
Changes										
1953 to 1954	-20	+ 8	--	+12	--	--	--	--	--	--
1954 to 1955	- 7	+ 5	--	+ 2	--	+14	+14	--	--	--
1953 to 1955	-27	+13	--	+14	--	+14	+14	--	--	--
80-2										
1953	60	--	17	--	--	--	--	77	3	80
1954	40	--	12	--	25	--	--	77	3	80
1955	33	--	15	--	29	--	--	77	3	80
Changes										
1953 to 1954	-20	--	- 5	--	+25	--	--	--	--	--
1954 to 1955	- 7	--	+ 3	--	+ 4	--	--	--	--	--
1953 to 1955	-27	--	- 2	--	+29	--	--	--	--	--
80-3										
1953	60	--	--	17	--	--	--	77	3	80
1954	40	--	--	25	--	12	--	77	3	80
1955	33	--	--	30	--	14	--	77	3	80
Changes										
1953 to 1954	-20	--	--	+ 8	--	+12	--	--	--	--
1954 to 1955	- 7	--	--	+ 5	--	+ 2	--	--	--	--
1953 to 1955	-27	--	--	+13	--	+14	--	--	--	--

they found it necessary to reduce potato acres as well as cotton. The operators of this model turned to field corn as a replacement crop for cotton. Short water supplies limit the acres of summer crops on the 80-3 farm; it already included barley in 1953. The acres diverted from cotton went into additional barley and to milo (Table 9). The result of these changes on all three farm models was to reduce physical production and gross receipts. The crops that operators substituted for cotton without exception produce a lower gross value per acre than cotton. The cotton-potato farm made this shift to less intensive crops for both cotton and a portion of the potatoes. This latter crop also provides much higher gross returns than the substituted crops.

These shifts had an important effect on land use. Cotton occupied more than half the total crop land acreage on all three units in 1953. Allotments cut this proportion in 1954 to about half, and in 1955 to less than half of the available crop acres. As a result, growers now can manage soils so that cotton occupies land no more often than one year in two. Farmers credit this reduction in the rate of using an individual acre to grow cotton with important cotton yield effects. The interviewees stated that they believe the practice of alternating cotton with other crops on practically all land, possible after allotments but not before, has resulted in more effective soil management. They give this factor part of the credit for higher cotton yields in 1954 and 1955.

In addition, the fact that a given acre is in a crop or use other than cotton in the current year makes it possible to time seed bed preparation operations more effectively, and do a better job of preparing for cotton in the following year. Most interviewees cited these facts as highly important in explaining higher cotton yields.

Fixed Costs Did Not Drop in Proportion to Cotton Acreage Cuts

Total fixed costs other than interest on land investments increased about $60 for the 80-1 farm between 1953 and 1955, and remained about the same for each of the other two 80-acre models (Tables 18-20). No decreases occurred in costs for interest on investment or other land costs for any of these units. The rigidity of fixed costs, or overhead, from year to year is characteristic in the farming business. This condition reflects the nature of capital commitments in farm land, improvements, and equipment.

All three of these 80-acre farm organizations are irrigated, highly-mechanized farms on land virtually 100 per cent tillable. Total current investments excluding land range from $14,300 to $15,000 at 1955 prices (Table 10). These are average investments for improvements and machinery, reflecting partial depreciation. The new cost at 1955 prices is much higher (Table 10).

Precise information for farm land values is not available. This analysis uses estimated values of $400 and $240 per acre, bare land basis, for the grade one and grade three land, respectively. These valuations indicate total land investments of $32,000 for each of the two units with adequate water and $19,200 for the 80-3 farm. The cost of farm land, bare basis, naturally might vary widely from the estimate used here.

The seriousness of net earnings implications accompanying relatively inflexible fixed costs under conditions of reduced gross farm income varies according to the tenure status of the operator and the extent to which he owns his capital outright. A tenant operator, for example, needs power units and operating equipment representing from $7,200 to $7,900 average investments, and much higher initial outlays (Table 10). If he owes on this equipment, he faces annual payments for interest and principal. Such obligations can equal, or even exceed the amount of fixed costs indicated by this analysis--a range of $3,500 to $4,000,

Table 10. Physical Resources and Investments for Typical 80-Acre Farms (80-1, 80-2, 80-3) in Upper San Joaquin Valley, 1955 Prices [a]

Item and description	Size or capacity	Amount	New cost [b]		Investment [b]	
			per unit	total	per unit	total
1	2	3	4	5	6	7
Land:						
Total farm	80 acres					
Cultivated land	77 acres					
Improvements:						
Shop, storage		1		$1250.00		$ 625.00
Tractor & equipment shed		1		500.00		250.00
Fuel storage - gas	350 gal.	1		110.00		55.00
Fuel storage - gas	550 gal.	1		135.00		67.50
Subtotal				1995.00		997.50
Irrigation facilities:						
Pumping plant (50 HP)	900 gpm	1		4900.00		2510.00
Well, casing (200' lift)	12" diam.	400'	6.50	2600.00		1300.00
Subtotal				7500.00		3810.00
Distribution system:						
Pipe	14"	3960'	.90	3564.00	.45	1782.00
Stands	5' x 36"	1	9.00	45.00	4.50	22.50
Valves, alfalfa	10"	36	15.00	540.00	7.50	270.00
Vents	5' x 6"	3	.75	11.25	.38	5.63
Row pipe	2"	300	1.50	450.00	.75	225.00
Siphons	1-1/2"	100	1.27	127.00	.64	63.50
Subtotal				4737.25		2368.63
Power:						
Wheel tractors	W-1	1		2600.00		1820.00
	W-2	1		3000.00		2100.00
Subtotal				5600.00		3920.00
Transportation:						
Pickup	1/2 ton	1		2000.00		1200.00
Equipment:						
Ditcher	4'	1		135.00		67.50
Chisel	8'	1		525.00		262.50
Disk-offset	6' 9"	1		525.00		262.50
Spiketooth harrow	4' section	3	30.00	90.00	15.00	45.00
Cultipacker	10'	1		325.00		162.50
Lister planter	2 row	1		350.00		175.00
Cultivator	2 row	1		350.00		175.00
Cotton trailer	5 bale	4	400.00	1600.00	220.00	880.00

(Continued on next page.)

Table 10 continued.

Item and description	Size or capacity	Amount	New cost		Investment	
			per unit	total	per unit	total
1	2	3	4	5	6	7
Additional equipment:						
80-1 only						
Power mower	7'	1		$ 350.00		$ 175.00
Side delivery rake	8'	1		520.00		260.00
80-2 only						
Potato planter	2 row	1		700.00		350.00
Steel roller	6'	1		200.00		100.00
Plow, 2 way	2-16"	1		550.00		275.00
Equipment 80-1				4770.00		2465.00
Equipment 80-2				5350.00		2755.00
Equipment 80-3				3900.00		2030.00
Total 80-1				$26,602.25		$14,761.13
Total 80-2				$27,182.25		$15,051.13
Total 80-3				$25,732.25		$14,326.13

a/ The designations 80-1, 80-2, 80-3 refer to three variations found in the 80 acre size group.

b/ Excluding land values.

not considering land. The farmer with heavy debt obligations, therefore, is much more vulnerable to sharp drops in gross receipts than the operator who owns his capital. This same principle, of course, applies to the landlord with mortgaged land, or the owner-operator who may have such debt service costs on operating equipment or farmland.

Cotton acreage allotments have accentuated the fixed cost problem by preventing farm operators from using the full capacity of some of their equipment. All three farm organizations reported important cuts in the hours of use for the tractor (Table 13). Total overhead costs remained relatively fixed and therefore, overhead and total costs per hour for tractor use increased (Tables 14-17). The operators on these 80-acre models do not own mechanical cotton harvesters. They were not concerned, therefore, with the increased cost per acre or per bale resulting from using a smaller fraction of the annual picking capacity of these machines.[a]

Farmers Increased Inputs and Yield on Cotton Acres Remaining Under Allotments

Farmers increased cotton yield in the Upper San Joaquin Valley and, thus partially offset the impact of reduced acres (Figure IV). This is consistent with an increase in state average yield from 632 pounds of lint in 1953 to 806 and 774 in 1954 and 1955 respectively. Kern County average yields were 770, 916, and 955 pounds per acre respectively, for these three years. Farmers returning questionnaires reported comparable yield increases for Kern County in 1954, and interviewees both confirmed the 1954 yield gains, and estimated that 1955 yields would be at similar levels. The above data support the accuracy of the farmers

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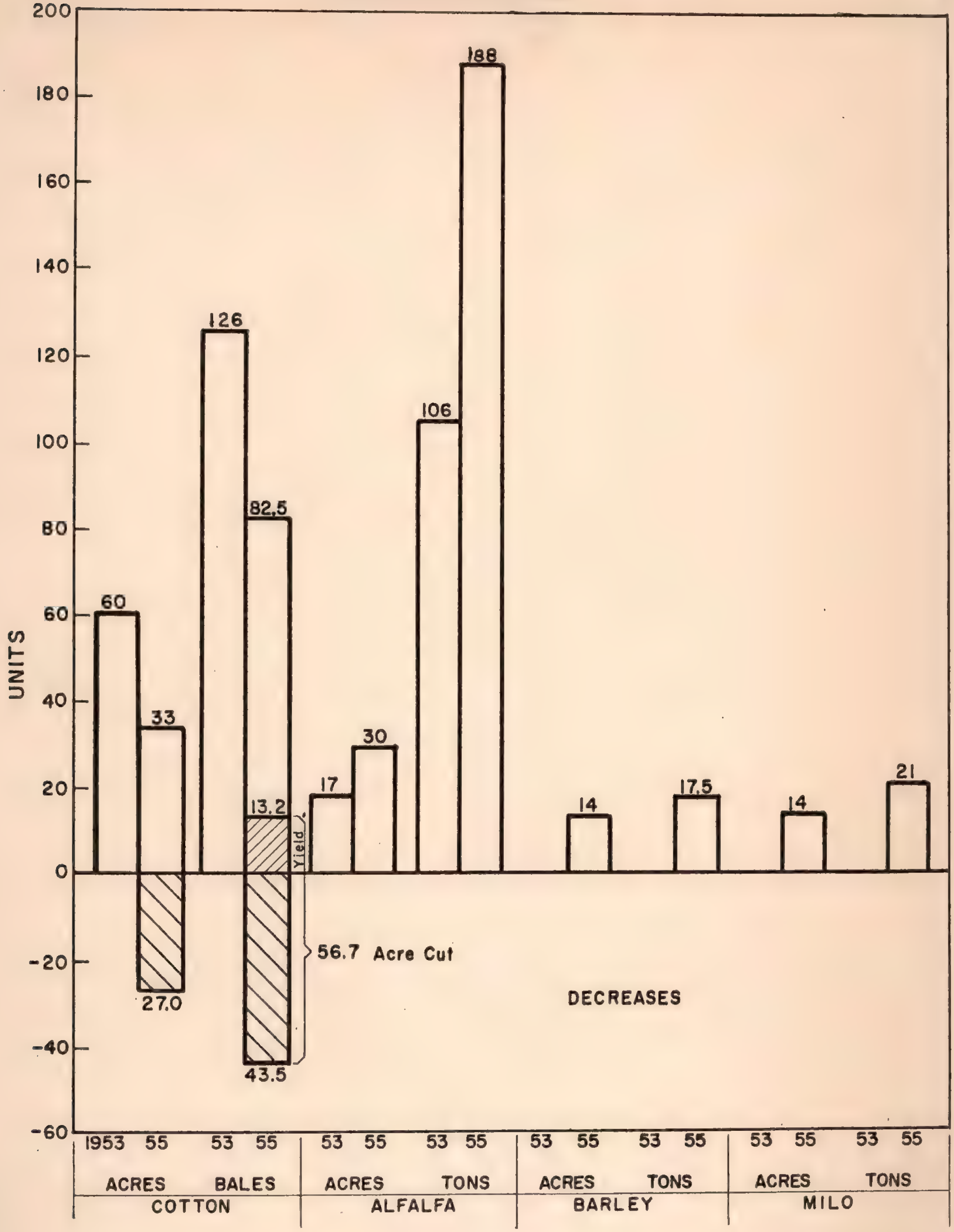
[a] About one-third of the operators of 80-acre farms interviewed did own mechanical cotton harvesters. We did not include such equipment when making up the budget for 80-acre models because it was not typical.

Figure IV. Changes in Acres and Production; Cotton and Other Crops on 80–1 Farms in Upper San Joaquin Valley, 1953–1955



Growers operating 80-acre farms increased cotton yields enough to offset about one-fourth of their 27 acre cut in cotton under the 1955 allotment program.

Table 11. Annual Irrigation Water Use by Crops, 1955 and 1953; 80-1, 80-2, 80-3 Farms in Upper San Joaquin Valley

Crop	1955				1953			
	Acres	Inches per acre	Total	Pumping hours required	Acres	Inches per acre	Total	Pumping hours required
1	2	3	4	5	6	7	8	9
80-1								
Cotton	33	42.00	1386.0	693.0	60	39.00	2340.0	1170.0
Alfalfa	30	57.60	1728.0	864.0	17	57.60	979.2	489.6
Barley	14	14.40	201.6	100.8	xxx			
Milo	14	27.00	378.0	189.0	xxx			
Total acre-inches			3693.6	1846.8			3319.2	1659.6
Total acre-feet			307.8				276.6	
80-2								
Cotton	33	42.00	1386.0	693.0	60	39.00	2340.0	1170.0
Potatoes	15	36.00	540.0	270.0	17	36.00	612.0	306.0
Corn	29	42.00	1218.0	609.0	xxx			
Total acre-inches			3144.0	1572.0			2952.0	1476.0
Total acre-feet			262.0				246.0	
80-3								
Cotton	33	42.00	1386.0	693.0	60	39.00	2340.0	1170.0
Barley	30	14.40	432.0	216.0	17	14.40	244.8	122.4
Milo	14	27.00	378.0	189.0	xxx			
Total acre-inches			2196.0	1098.0			2584.8	1292.4
Total acre-feet			183.0				215.4	

Table 12. Costs for Irrigation Equipment, 1955 and 1953; 80-1, 80-2, and 80-3 Farms in Upper San Joaquin Valley

A. Overhead 80-1, 80-2, 80-3

Item	Original cost	Life expected	Average investment	Annual Non Cash Overhead Costs			Taxes and Insur.	Total overhead
				Depr.	Interest	Total		
Pumping plant	4900.00	20	2510.00a/	239.00	125.50	364.50	12.07	376.57
Well & casing	2600.00	20	1300.00	130.00	65.00	195.00	6.25	201.25
Pipe line	3620.00	30	1810.00	120.67	90.50	211.17	8.71	219.88
Valves-alfalfa	540.00	30	270.00	18.00	13.50	31.50	1.30	32.80
Siphons	127.00	5	64.00	25.40	3.20	28.60	.31	28.91
Rowpipe	450.00	10	225.00	45.00	11.25	56.25	1.08	57.33
Total						887.02		916.74

B. Operating and total costs 80-1

Item	1955				1953			
	Operating costs			Total annual cost	Operating costs			Total annual cost
	Power & lube b/	Repairs	Total		Power & lube b/	Repairs	Total	
Pumping plant	1455.79	98.00	1553.79	1930.36	1391.15	98.00	1489.15	1865.72
Well & casing	-	-	-	201.25	-	-	-	201.25
Pipe line	-	18.10	18.10	237.98	-	18.10	18.10	237.98
Valves-alfalfa	-	2.70	2.70	35.50	-	2.70	2.70	35.50
Siphons	-	-	-	28.91	-	-	-	28.91
Rowpipe	-	-	-	57.33	-	-	-	57.33
Total			1574.59	2491.33			1509.95	2426.69
C. Operating and total costs 80-2								
Pumping plant	1353.98	98.00	1451.98	1828.55	1302.76	98.00	1400.76	1777.33
Well & casing	-	-	-	201.25	-	-	-	201.25
Pipe line	-	18.10	18.10	237.98	-	18.10	18.10	237.98
Valves-alfalfa	-	2.70	2.70	35.50	-	2.70	2.70	35.50
Siphons	-	-	-	28.91	-	-	-	28.91
Rowpipe	-	-	-	57.33	-	-	-	57.33
Total			1472.78	2389.52			1421.56	2338.30
D. Operating and total costs 80-3								
Pumping plant	1101.04	98.00	1199.04	1575.61	1204.78	98.00	1302.78	1679.35
Well & casing	-	-	-	201.25	-	-	-	201.25
Pipe line	-	18.10	18.10	237.98	-	18.10	18.10	237.98
Valves-alfalfa	-	2.70	2.70	35.50	-	2.70	2.70	35.50
Siphons	-	-	-	28.91	-	-	-	28.91
Rowpipe	-	-	-	57.33	-	-	-	57.33
Total			1219.84	2136.58			1323.58	2240.32

E. Unit Costs c/

		1955			1953		
		overhead	operating	total	overhead	operating	total
80-1	Cost per acre-inch	.248	.427	.675	.276	.455	.731
	Cost per acre-foot	2.978	5.116	8.094	3.314	5.459	8.773
80-2	Cost per acre-inch	.292	.468	.760	.311	.481	.792
	Cost per acre-foot	3.499	5.621	9.120	3.726	5.779	9.505
80-3	Cost per acre-inch	.417	.551	.968	.355	.521	.867
	Cost per acre-foot	5.010	6.665	11.675	4.256	6.145	10.401

a/ Salvage value of $120.00 considered.

b/ Power for pumping irrigation water includes demand charge, varying with motor horsepower, and current consumed at rates varying with amount used.

c/ Water produced per farm in acre-feet:

	1955	1953
80-1	307.8	276.6
80-2	262.0	246.0
80-3	183.0	215.4

Table 13. Annual Tractor Hours, 1955 and 1953; 80-1, 80-2, and 80-3 Farms in Upper San Joaquin Valley

Crop	W-1		W-2	
	1955	1953	1955	1953
1	2	3	4	5
80-1				
Cotton	179.85	327.00	161.37	293.40
Alfalfa	129.30	73.27	12.60	7.14
Barley	6.16	xxx	15.68	xxx
Milo	40.60	xxx	31.22	xxx
Total Hours	355.91	400.27	220.87	300.54
80-2				
Cotton	179.85	327.00	161.37	293.40
Potatoes	32.55	36.89	54.75	62.05
Corn	84.10	xxx	77.72	xxx
Total Hours	296.50	363.89	293.84	355.45
80-3				
Cotton	179.85	327.00	161.37	293.40
Barley	13.20	7.48	33.60	19.04
Milo	40.60	xxx	31.22	xxx
Total Hours	233.65	334.48	226.19	312.44

early estimates. The explanation of the increased cotton yields lies in increased fertilizer applications, as reported in both questionnaires and interviews, more irrigation water reported by interviewees, and other increases in inputs that are more difficult to identify and measure precisely.

Interviewees reported that they used more fertilizer and more irrigation water in growing cotton after allotments came into effect. They indicated no other increases in materials. These farmers did state, however, that they attribute a portion of the yield gain to improved land management. They credited rotations permitting land to rest between cotton crops and more time for seed bed preparation as two factors helping them obtain increased yields.

Both farmers and people in agencies serving farmers also credited better timing in irrigation, insect control measures, cultivating, and other cultural operations as important in explaining the yield gains. It was impossible to obtain data to measure any of these factors. It was possible, of course, to determine the extra amount of labor and other harvesting services required at harvest time, as a result of the increase in seed cotton tonnage.

All sources agreed that cotton growers have applied more fertilizer under acre allotments. This analysis indicates an increase from 115 pounds of actual nitrogen per acre in 1953 to 130 pounds of actual nitrogen in 1955, for each of the three 80-acre farm models. The increase in irrigation water is estimated at three acre inches per acre (Table 11). The dollar value of total inputs per acre for cotton also increased for all three 80-acre farms, due mainly to about $25 increase in operating or variable expenses (Tables 18-20). Other than the increased fertilizer, appearing under contracts, added water and contracted harvesting operations, these costs per acre reflect increased repair costs per hour of use for the various power units and pieces of farm equipment. This latter item actually resembles a fixed cost in the manner it affects per acre

Table 14. Overhead Costs for Tractors and Equipment, 1955 and 1953; 80-1, 80-2, 80-3 Farms in Upper San Joaquin Valley

Item	Original cost	Life expected	Salvage value	Average investment	Annual noncash overhead costs			Taxes and insurance	All over-head
					Depr.	Int.	Total		
1	2	3	4	5	6	7	8	9	10
	dollars	years			dollars				
W-1 tractor	2600	6	1040	1820	260.00	91.00	351.00	6.06	357.06
W-2 tractor	3000	6	1200	2100	300.00	105.00	405.00	6.99	411.99
Pickup 1/2 ton	2000	5	400	1200	320.00	60.00	380.00	54.00	434.00
4' ditcher	135	10	0	68	13.50	3.40	16.90	.23	17.13
8' chisel	525	10	0	262	52.50	13.10	65.60	.87	66.47
6'9" offset disk	525	10	0	262	52.50	13.10	65.60	.87	66.47
12' spiketooth harrow	90	15	0	45	6.00	2.25	8.25	.15	8.40
10' cultipacker	325	10	0	162	32.50	8.10	40.60	.54	41.14
2 row lister planter	350	10	0	175	35.00	8.75	43.75	.58	44.33
2 row cultivator	350	10	0	175	35.00	8.75	43.75	.58	44.33
5 bale cotton trailer (4)	1600	5	160	880	288.00	44.00	332.00	2.93	334.93
Additional equipment:									
80-1 only									
7' power mower	350	10	0	175	35.00	8.75	43.75	.58	44.33
8' side delivery rake	520	10	0	260	52.00	13.00	65.00	.87	65.87
80-2 only									
2 row potato planter	700	15	0	350	46.67	17.50	64.17	1.17	65.34
6' steel roller	200	15	0	100	13.33	5.00	18.33	.33	18.66
2 way/2-16" plow	550	10	0	275	55.00	13.75	68.75	.92	69.67
Total 80-1							$1861.20		$1936.45
Total 80-2							$1903.70		$1979.92
Total 80-3							$1752.45		$1826.25

Table 15. Operating and Total Annual Costs for Tractors and Equipment, 1955 and 1953; 80-1 Farms in Upper San Joaquin Valley

Item	1955					1953				
	Operating costs			Total annual cost	Cost per hour	Operating costs			Total annual cost	Cost per hour
	fuel and lube	repairs	total			fuel and lube	repairs	total		
				dollars						
W-1 tractor	118.60	60.00	178.60	535.66	1.505	128.80	80.00	208.80	565.86	1.414
W-2 tractor	176.30	70.00	246.30	658.29	2.980	213.27	95.00	308.27	720.26	2.397
Pickup 1/2 ton	250.00	100.00	350.00	784.00	.078[a]	250.00	100.00	350.00	784.00	.078[a]
4' ditcher	-	4.05	4.05	21.18	1.668	-	4.05	4.05	21.18	1.177
8' chisel	-	52.50	52.50	118.97	2.403	-	52.50	52.50	118.97	1.322
6' 9" offset disk	-	78.75	78.75	145.22	1.508	-	78.75	78.75	145.22	1.794
12' spiketooth harrow	-	1.80	1.80	10.20	.527	-	1.80	1.80	10.20	.667
10' cultipacker	-	32.50	32.50	73.64	4.842	-	32.50	32.50	73.64	4.546
2 row lister planter	-	35.00	35.00	79.33	1.592	-	35.00	35.00	79.33	1.247
2 row cultivator	-	70.00	70.00	114.33	.580	-	70.00	70.00	114.33	.384
5 bale cotton trailer (4)	-	48.00	48.00	382.93	7.736	-	48.00	48.00	382.93	4.256
7' power mower	-	35.00	35.00	79.33	1.219	-	35.00	35.00	79.33	2.150
8' side delivery rake	-	52.00	52.00	117.87	1.935	-	52.00	52.00	117.87	3.416
Total 80-1			$1184.50	$3120.95				$1276.67	$3213.12	

[a] Cost per mile

Table 16. Operating and Total Annual Costs for Tractors and Equipment, 1955 and 1953;
80-2 Farms in Upper San Joaquin Valley

Item	1955					1953				
	Operating costs			Total annual cost	Cost per hour	Operating costs			Total annual cost	Cost per hour
	fuel and lube	repairs	total			fuel and lube	repairs	total		
				dollars						
W-1 tractor	118.60	60.00	178.60	535.66	1.807	145.57	80.00	225.57	582.63	1.601
W-2 tractor	176.30	70.00	246.30	658.29	2.240	213.27	95.00	308.27	720.26	2.026
Pickup 1/2 ton	250.00	100.00	350.00	784.00	.078[a]	250.00	100.00	350.00	784.00	.078[a]
4' ditcher	-	4.05	4.05	21.18	1.231	-	4.05	4.05	21.18	1.075
2 way/2-16" plow	-	82.50	82.50	152.17	3.843	-	82.50	82.50	152.17	9.946
8' chisel	-	52.50	52.50	118.97	2.403	-	52.50	52.50	118.97	1.322
6' 9" offset disk	-	78.75	78.75	145.22	1.741	-	78.75	78.75	145.22	1.522
12' spiketooth harrow	-	1.80	1.80	10.20	.677	-	1.80	1.80	10.20	.463
10' cultipacker	-	32.50	32.50	73.64	8.263	-	32.50	32.50	73.64	4.546
2 row lister planter	-	35.00	35.00	79.33	1.207	-	35.00	35.00	79.33	1.247
2 row cultivator	-	70.00	70.00	114.33	.443	-	70.00	70.00	114.33	.351
5 bale cotton trailer (4)	-	48.00	48.00	382.93	7.736	-	48.00	48.00	382.93	4.256
2 row potato planter	-	70.00	70.00	135.34	7.049	-	70.00	70.00	135.34	6.220
6' steel roller	-	10.00	10.00	28.66	6.369	-	10.00	10.00	28.66	5.620
Total 80-2			$1260.00	$3239.92				$1368.94	$3348.86	

[a] Cost per mile

Table 17. Operating and Total Annual Costs for Tractors and Equipment, 1955 and 1953; 80-3 Farms in Upper San Joaquin Valley

	1955					1953				
	Operating costs			Total annual cost	Cost per hour	Operating costs			Total annual cost	Cost per hour
Item	fuel and lube	repairs	total			fuel and lube	repairs	total		
				dollars						
W-1 tractor	93.46	60.00	153.46	510.52	2.185	133.79	60.00	193.79	550.85	1.647
W-2 tractor	135.71	70.00	205.71	617.70	2.731	187.46	70.00	257.46	669.45	2.143
Pickup 1/2 ton	250.00	100.00	350.00	784.00	.078 a/	250.00	100.00	350.00	784.00	.078 a/
4' ditcher	-	4.05	4.05	21.18	1.668	-	4.05	4.05	21.18	1.177
8' chisel	-	52.50	52.50	118.97	2.403	-	52.50	52.50	118.97	1.322
6' 9" offset disk	-	78.75	78.75	145.22	1.701	-	78.75	78.75	145.22	1.630
12' spiketooth harrow	-	1.80	1.80	10.20	.320	-	1.80	1.80	10.20	.376
10' cultipacker	-	32.50	32.50	73.64	4.842	-	32.50	32.50	73.64	4.546
2 row lister planter	-	35.00	35.00	79.33	1.592	-	35.00	35.00	79.33	1.247
2 row cultivator	-	70.00	70.00	114.33	.580	-	70.00	70.00	114.33	.384
5 bale cotton trailer (4)	-	48.00	48.00	382.93	7.736	-	48.00	48.00	382.93	4.256
Total 80-3			$1031.77	$2858.02				$1123.85	$2950.10	

a/ Cost per mile

Table 18. Input Costs by Crops and Total Farm, 1955 and 1953, 80-1 Farm in Upper San Joaquin Valley

	1955								
	Cotton 33 acres		Alfalfa 30 acres		Barley 14 acres		Milo 14 acres		All crops total
Item	per acre	total	per acre	total	per acre	total	per acre	total	77 acres
1	2	3	4	5	6	7	8	9	10
					dollars				
Overhead	58.85	1,948.32	46.58	1,403.61	12.41	177.09	26.40	372.95	3,901.97
Operating:									
Power	13.83	456.39	4.95	148.50	4.31	60.34	6.79	95.06	760.29
Equipment	7.91	261.03	2.90	87.00	.99	13.86	3.75	52.50	414.39
Materials	20.00	660.00	24.60	738.00	9.35	130.90	12.33	172.62	1,701.52
Labor	37.02	1,221.66	33.98	1,019.40	10.62	148.68	20.93	292.98	2,682.72
Contracts a/	141.51	4,669.93	32.82	984.60	12.62	176.65	15.76	220.68	6,051.86
Total operating	220.27	7,269.01	99.25	2,977.50	37.89	530.43	59.56	833.84	11,610.78
Total cost	279.12	9,217.33	145.83	4,381.11	50.30	707.52	85.96	1,206.79	15,512.75
	1953								
	60 acres		17 acres		---		---		77 acres
					dollars				
Overhead	49.50	2,982.58	50.79	859.67					3,842.25
Operating:									
Power	12.97	778.20	4.75	80.75					858.95
Equipment	5.91	354.60	5.12	87.04					441.64
Materials	19.81	1,188.60	26.21	445.57					1,634.17
Labor	35.27	2,116.20	33.79	574.43					2,690.63
Contracts a/	123.35	7,400.76	32.82	557.94					7,958.70
Total operating	197.31	11,838.36	102.69	1,745.73					13,584.09
Total cost	246.81	14,820.94	152.88	2,605.40					17,426.34

a/ Includes fertilizer (1955, 130; 1953, 115 pounds), insecticide (60 pounds), and defoliant (10 pounds).

Table 19. Input Costs by Crops and Total Farm, 1955 and 1953, 80-2 Farm in Upper San Joaquin Valley

Item	Cotton 33 acres		Potatoes 15 acres		Field Corn 29 acres		All crop total 77 acres
	per acre	total	per acre	total	per acre	total	
1	2	3	4	5	6	7	8
	1955						
				dollars			
Total overhead	60.50	2,002.77	41.63	630.85	37.59	1,096.42	3,730.04
Operating:							
Power	13.76	454.08	7.55	113.25	7.18	208.22	775.55
Equipment	7.84	258.72	9.01	135.15	4.01	116.29	510.16
Materials	21.73	717.09	147.65	2,214.75	22.26	645.54	3,577.38
Labor	37.60	1,240.80	26.92	403.73	28.83	836.07	2,480.60
Contracts a/	141.56	4,671.40	268.22	4,023.31	56.48	1,637.66	10,332.37
Total operating	222.49	7,342.09	459.35	6,890.19	118.76	3,443.78	17,676.06
Total cost	282.99	9,344.86	500.98	7,521.04	156.35	4,540.20	21,406.10
	1953						
	60 acres		17 acres		---		77 acres
				dollars			
Total overhead	50.04	3,014.98	41.74	715.98			3,730.96
Operating:							
Power	12.73	763.80	7.06	120.02			883.82
Equipment	5.60	336.00	11.07	188.19			524.19
Materials	20.83	1,249.80	148.12	2,518.04			3,767.84
Labor	35.27	2,116.20	26.44	449.47			2,565.67
Contracts a/	123.36	7,401.54	268.28	4,560.69			11,962.23
Total operating	197.79	11,867.34	460.97	7,836.41			19,703.75
Total cost	247.83	14,882.32	502.71	8,552.39			23,434.71

a/ Includes fertilizer (1955, 130; 1953, 115 pounds), insecticide (60 pounds), and defoliant (10 pounds).

Table 20. Input Costs by Crops and Total Farm, 1955 and 1953,
80-3 Farm in Upper San Joaquin Valley

	1955						
	Cotton 33 acres		Barley 30 acres		Milo 14 acres		All crop total
Item	per acre	total	per acre	total	per acre	total	77 acre
1	2	3	4	5	6	7	8
				dollars			
Total overhead	69.56	2,301.75	24.18	731.69=	38.24	541.78	3,575.22
Operating:							
Power	14.40	475.20	4.49	134.70	7.12	99.68	709.58
Equipment	8.03	264.99	1.04	31.20	3.88	54.32	350.51
Materials	25.21	831.93	11.13	333.90	15.68	219.52	1,385.35
Labor	37.69	1,243.77	10.91	327.30	21.23	297.22	1,868.29
Contracts a/	113.35	3,740.49	12.83	384.93	18.72	262.15	4,387.57
Total operating	198.68	6,556.38	40.40	1,212.03	66.63	932.89	8,701.30
Total cost	268.24	8,858.13	64.58	1,943.72	104.87	1,474.67	12,276.52
	1953						
	60 acres		17 acres		---		77 acre
				dollars			
Total overhead	53.15	3,201.58	21.75	376.15			3,577.73
Operating:							
Power	12.30	738.00	3.73	63.41			801.41
Equipment	5.78	346.80	.95	16.15			362.95
Materials	22.04	1,322.40	10.57	179.69			1,502.09
Labor	35.33	2,119.80	10.43	177.31			2,297.11
Contracts a/	99.13	5,948.02	11.83	201.03			6,149.05
Total operating	174.58	10,475.02	37.51	637.59			11,112.61
Total cost	227.73	13,676.60	59.26	1,013.74			14,690.34

a/ Includes fertilizer (1955, 130; 1953, 115 pounds), insecticide (60 pounds), and defoliant (10 pounds).

or per pound costs under acre cuts. Fixed, or overhead costs, of course, also increased from 1953 to 1955 for reasons already indicated above.

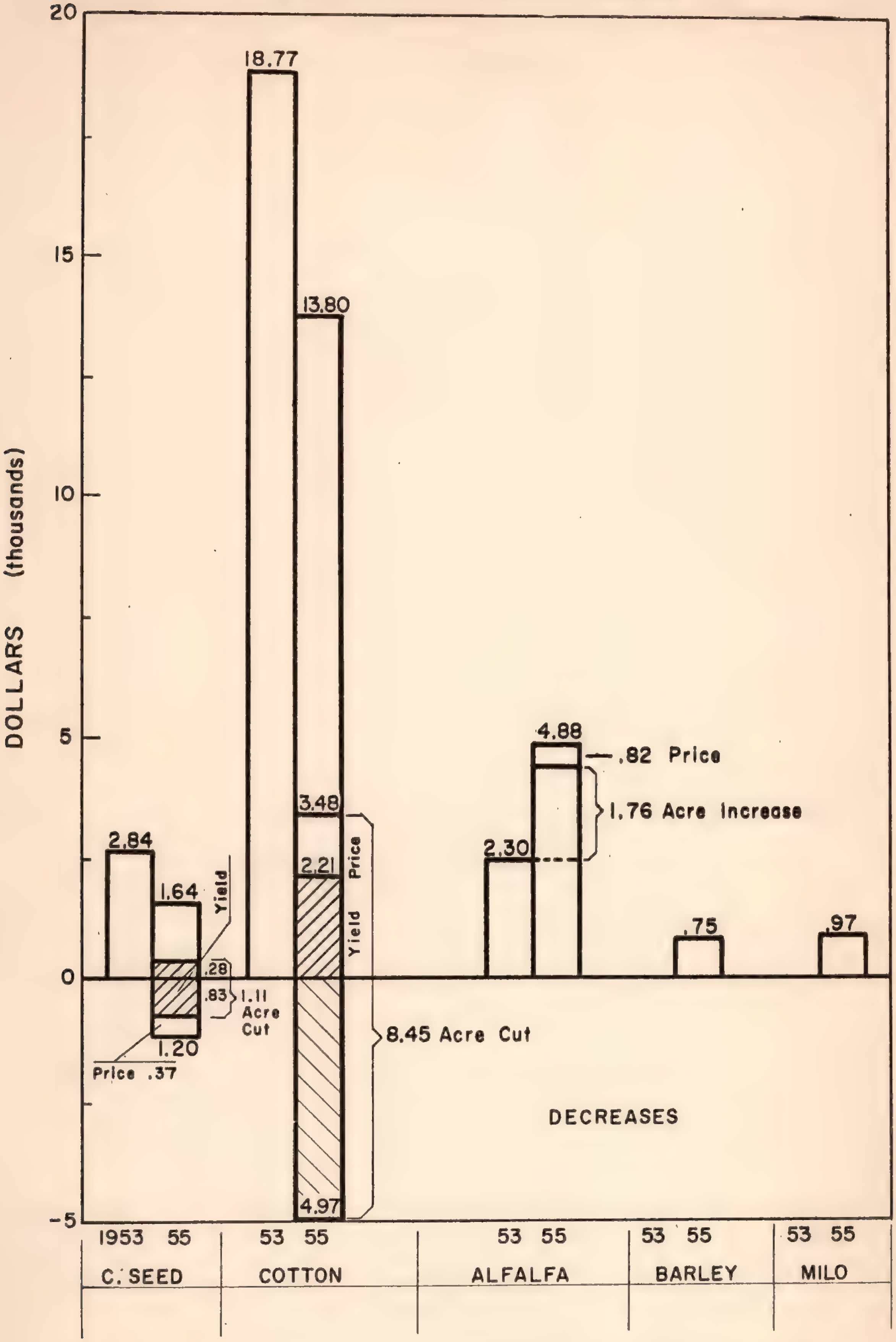
There was little evidence of effective efforts by reporting farmers to increase yields of crops other than cotton. It is evident from the number of farmers reporting, the original acreage totals and the increases for such crops as field corn and milo that most farmers had had relatively little experience with these crops prior to allotments.

Changes in gross receipts from 1953 to 1955 reflect shifts in acres, yields and prices. Gross receipts for the 80-1 farm would have dropped about $6,000 under the 1953-1955 acreage shifts if yields and prices for all products had remained the same (Figure V). The fact that the actual decline amounted to only about $1,900 indicates the net effects of the changes in crop acreages, yields, and total production already outlined, plus the influence of price variations between the two years. Cotton exerted the greatest influence on total farm gross receipts both before and after allotments. Production after the acreage cut at the 1953 yields, and if sold at 1953 prices, would have resulted in a drop of $8,450 (Figure V). Higher yields offset over $2,000 of this threatened decline, and a price rise between the two seasons spared farmers the effects of another $1,300.

The price for cottonseed dropped between the two years, and therefore aggravated the negative influence of acreage cuts on gross receipts. This price decline alone would have reduced gross receipts by nearly $400 with the same total production as in 1953. The cut in acres, if 1953 yields had prevailed, would have subtracted another $1,100 to make a total decline of about $1,500 from 1953 to 1955. The yield increase offset these negative factors to the extent of nearly $300, and the result is a net drop of $1,200 (Figure V).

Alfalfa gained in both total production and price, and contributed nearly $2,600 more of gross receipts in 1955 than in 1953. The price rise of more than

Figure V. Changes on Gross Receipts; Cotton and Other Crops on 80–1 Farms in Upper San Joaquin Valley, 1953–1955 (in thousands dollars)



Higher yields and prices for cotton, more acres and higher prices for alfalfa cushioned the impact of the cotton allotment program on gross receipts of 80-acre farms in 1955.

Table 21. Gross Receipts, Costs, and Earnings by Crops and Total Farm, 1955 and 1953, 80-1 Farm in Upper San Joaquin Valley

Item	Cotton seed	Cotton lint	Alfalfa	Barley	Milo	Total farm
1	2	3	4	5	6	7
		1955				
Acres		33	30	14	14	
Yield		2.5 bales	6.25 tons	25 cwt	30 cwt	
Production	35.6 tons	82.5 bales	187.5 "	350 cwt	420 cwt	
Price (dollars)	46.00	167.30	26.00	2.15	2.30	
	1,637.60	13,802.25				
		dollars				
Gross receipts		15,439.85	4,875.00	752.50	966.00	22,033.35
Costs (less int. on land)		9,217.33	4,381.11	707.52	1,206.79	15,512.75
Receipts minus costs		6,222.52	493.89	44.98	(240.79)	6,520.60
Land interest ($400 per acre at 5%)		690.00	615.00	147.50	147.50	1,600.00
Net		5,532.52	(121.11)	(102.52)	(388.29)	4,920.60
Add:						
Interest on fixed capital (includes land)						2,337.03
Operator's labor						969.47
Net farm income						8,227.10
Less:						
Operator's labor						2,500.00
Return to capital and management a/						5,727.10
Rate earned on investment a/						12.25%
		1953				
Acres		60	17	--	--	
Yield		2.1 bales	6.25 tons			
Production	53.6 tons	126 bales	106.25 "			
Price (dollars)	53.00	148.99	21.60			
	2,840.80	18,772.74				
		dollars				
Gross receipts		21,613.54	2,295.00			23,908.54
Costs (less int. on land)		14,820.94	2,605.40			17,426.34
Receipts minus costs		6,792.60	(310.40)			6,482.20
Land interest ($400 per acre at 5%)		1,230.00	370.00			1,600.00
Net		5,562.60	(680.40)			4,882.20
Add:						
Interest on fixed capital (includes land)						2,337.03
Operator's labor						1,181.74
Net farm income						8,400.97
Less:						
Operator's labor						2,500.00
Return to capital and management a/						5,900.97
Rate earned on investment a/						12.62%

(Continued on next page.)

Table 21 continued.

a/ Obtained as follows:

Gross receipts includes the total of all sales receipts from all farm enterprises.

Subtract: Costs of all farm inputs, except interest on value of bare land, including imputed values for noncash items such as depreciation and unpaid family labor.

Receipts minus costs represents gross receipts less costs.

Subtract: Land interest calculated at five per cent on the estimated value of the farm land.

Net represents receipts minus costs less land interest.

Add: Interest on fixed capital, including land, at five per cent, and Operator's labor, the value of the actual labor hours the operator worked on the various enterprises calculated at the going rate for hired labor.

Net farm income represents the net plus the values of interest on fixed capital and operator's labor and any other unpaid family labor actually used. This is the total farm return to pay for the operators and any other unpaid family labor and for the use of the farm capital.

Subtract: Operator's labor and any other unpaid family labor imputed for the full year at the going rate that might have been earned at other alternative employment.

Return to capital and management is the amount remaining after subtracting the value of operators and any other unpaid family labor above. This is the amount that is left to pay for the operator's management and for the use of the farm capital.

Rate earned on investment is the amount of the return to capital and management expressed as a percentage of the total farm investment.

This same method of calculation applies to other similar tables appearing later.

four dollars was important. The combined effect of barley and milo was to add about $1,750 to gross receipts in 1955.

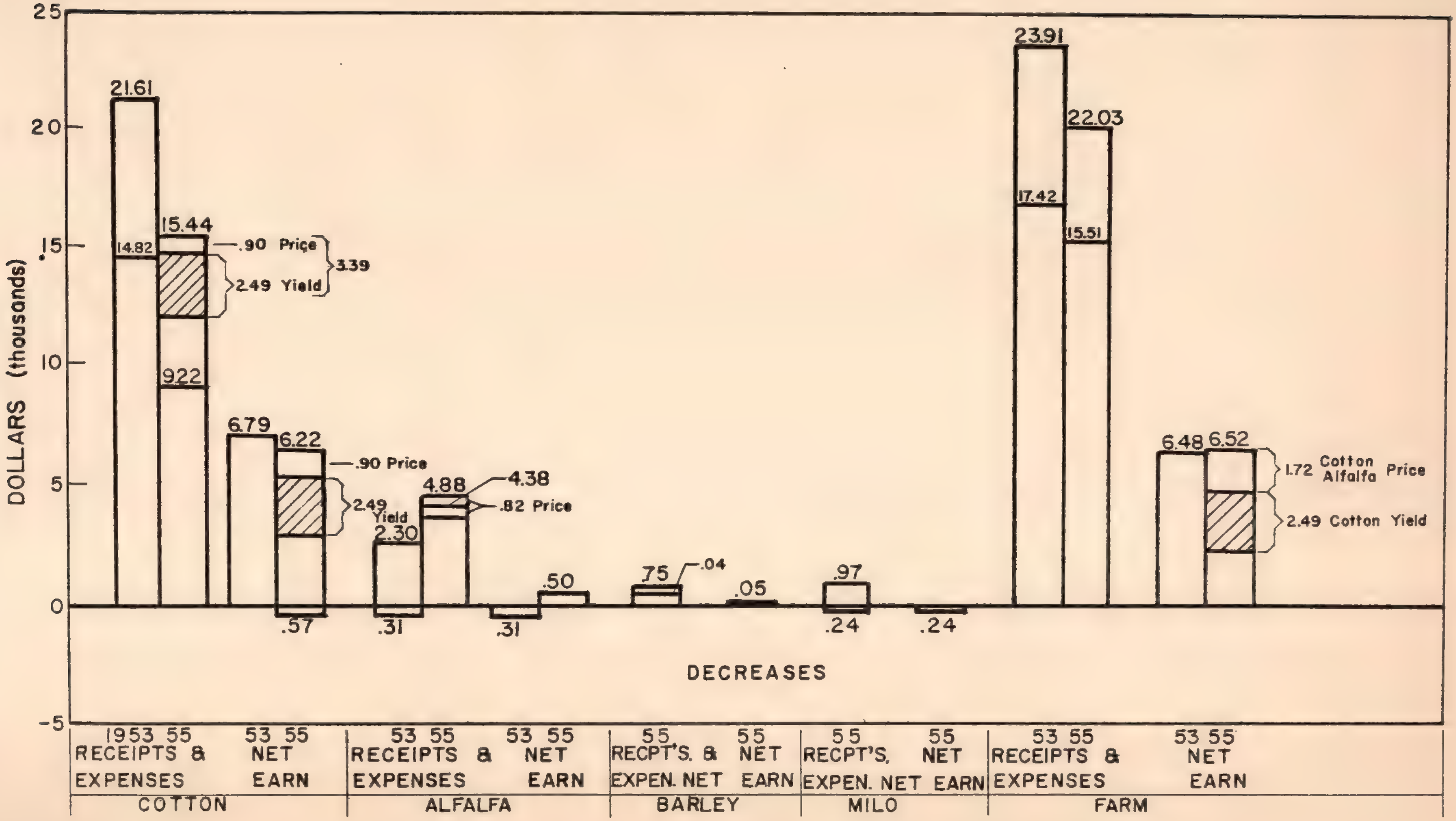
Cotton returned virtually all the net above expenses to pay for use of land and management in both 1953 and 1955. The 80-1 farming unit returned $6,500 above expenses to pay for the use of the land and for the operators' managerial ability in 1955; this amount was almost identical with 1953 returns, calculated in the same way (Figure VI and Table 21). Cotton accounted for all of these net returns in 1955, except $150, and actually exceeded the farm total in 1953 by $314, the amount of net loss on alfalfa! These figures reveal unmistakably the importance of cotton in these 80-acre farm organizations in the Upper San Joaquin Valley.

These relative newcomers to the ranks of feed grain growers certainly have not had enough time since they made the shift to perfect their technology and gain adequate practical experience. There is evidence from individual grower reports that growers in general will be able to improve yields for some of the crops that they have substituted for cotton. This tendency should become evident during the next few years if the acreage allotments continue, and the growers therefore, gain added experience with the substitute crops.

In Addition to Higher Gross Receipts per Acre from Cotton, Operators of the 80-1 Cotton-Alfalfa Farms Benefited from Higher Alfalfa Prices in 1955.

Less cotton, more feed crops are grown by operators on 80-1 farms under cotton acreage allotments. Data on physical production reflect the changes in crop organization and yields for the 80-1 farming unit under the allotment program. This unit does not include potatoes, and the returns from the other crops are such relative to cotton as to indicate that the actual changes from 1953 to 1955 reflect the efforts of farm operators on these farms to adjust to the allotment program. Cotton acres dropped 27 acres between 1953 and 1955, while alfalfa

Figure VI. Changes in Gross Receipts, Expenses, and Net Production on 80–1 Farms in Upper San Joaquin Valley, 1953–1955 (in thousands dollars)



Cotton was the crop with the greatest influence on net returns both before and after allotments. The yield and price gains in 1955 offset much of the impact of acre cuts.

increased 13 acres and barley, followed by milo as a double crop, increased 14 acres (Figure IV). Operators represented by this farm model, therefore turned to feed crops to replace cotton on all the diverted acres.

Yield gains offset almost one-fourth of the effects of the cotton acre reductions. The total production in 1955 amounted to 82.5 bales, whereas, had yields in this year remained at the 1953 level, the total would have been 69.3 bales (Figure IV, and Table 21). Alfalfa production increased in 1955 to 188 tons, as compared with 106 in 1953, with no change in yields. This model produced no barley or milo in 1953 and, therefore all production represented additions over 1955 for these crops. These quantities were 17.5 tons of barley and 21 of milo, respectively.

The 1955 yield increases and the price rise for cotton in that year explain $3,400 or 52 per cent of the total farm net returns (Figure VI). Without these favorable shifts and the rise in alfalfa price the operators of such farms would have had only about $2,300 in 1955 to pay for the use of the land and for their own management.

Net returns for the 80-1 farm are at minimum level necessary to pay for land and management. The "net minus costs" indicates the amount of income left to the operator to pay for the use of land for his own management (Table 21, Column 6). As already indicated, this amount for the 80-1 model was $6,500 in 1955, up slightly from 1953. The analysis also proceeds from this earnings measure to impute a cost or return to land, and the operator's own time, and to calculate the dollar returns to capital and management and the rate of earning that the latter value represents on the farm capital investment.

Operators on the 80-1 farms received $5,700 for their management plus the use of the capital invested in land, improvements and operating equipment in 1955. The comparable return for 1953 was $5,900. The reason for the lower capital and management return in 1955 than in 1953, in spite of the fact that

receipts minus costs is higher in the later year, lies in less complete use of the operators own labor in 1955. This is a highly important consideration on small-sized farms where operators and other unpaid family labor may constitute the greater portion of the farm labor force. One often serious result of the cut in cotton acreage on such farms is that the farm business no longer is able to offer remunerative employment for resident labor force.

The rate of return on capital invested in the farm business was 12.25 per cent in 1955, as compared with 12.62 per cent in 1953. At first glance these per cents appear to represent relatively satisfactory earnings rates, while the drop from 1953 to 1955 is nominal. The relatively small size of the business must be considered, however, when evaluating these percentage measures of total farm profits. Probably the actual dollar returns to capital and management is more useful than the percentages for the 80-acre farms for this reason. These figures are below $6,000 in both years, and even after adding in the value of the operator's own labor the total net farm income stands at less than $8,500. Another important factor in this context is that the 80-1 cotton-farm model in this analysis is well above the average of the 80-acre farms in the Upper San Joaquin Valley in earning capacity. It will be shown in later sections that the profits for most 80-acre farms and the average of all will be appreciably below this level.

One difficult problem in calculating all earnings measures, except receipts minus costs, is the fact that no precise data are available to indicate the actual value of land. The interest on land (valued as bare land at $400 per acre) amounts to $20 per acre or $1,600 for the entire 80-acre unit, using 5 per cent as the rate of interest. Interest, depreciation, and repairs on all improvements (original cost about $14,000) would equal about $1,000. Taxes, about $650, already have been deducted in computing fixed costs. The sum of these

three items, $3,050, represents $38 per acre or less than the usual rate of cash rent for land if included in these Upper San Joaquin Valley farms. This fact suggests that the actual market value for the bare land is higher than that used in this analysis.

Another approach is to use a usual cash rental rate of $50.00 for example, and work back from this value. Such procedure, using the above data, would result in charging $2,350, instead of $1,600, for land cost. The net returns to capital and management and the rate earned would be 11 per cent instead of the indicated 12 per cent.

Suppose, again, that our estimates for (bare) land values are 50 per cent below the current market value of the farm land. The result would be that the profit rates would be 9.1 per cent in 1955 and 9.4 per cent in 1953, respectively. To the extent we may have erred on the low side, our indicated profit rates are higher than they should be, and the opposite is true if our estimated land values are too high. These comments also apply to farms of 160 and 320 acres.

We do not consider the rates earned as precise values because of the limitations illustrated by the above discussion. They, along with the other measures, used in the analysis, do serve however, to evaluate the size and the adequacy of the earnings of these 80-acre farms, to make comparisons among them, and to compare them with farms of other sizes.

Another measure that is highly useful to the operator when the time comes to meet his outstanding obligations is the actual net cash balance; the excess of cash receipts over cash expenses. This value amounted to $9,480 in 1955 and $9,380 in 1953 for the 80-1 farm.

Operators on the 80-2 Cotton-Potato Farms Increased Earnings from 1953 to 1955, but Still Earned Less than Those on the 80-1 Farms.

The 80-2 cotton-potato farm is important in the Shafter-Wasco locality, and to some extent in other potato-growing sections in the Upper San Joaquin Valley.

Potatoes sold at highly unsatisfactory prices, and, therefore, brought net losses to many growers in 1953. For this reason, the comparison of the 80-2 cotton-potato farms for 1955 and 1953 shows higher earnings in 1955. The rate earned on capital investment, 10.1 per cent, was lower than for the 80-1 farm either before or following the allotment programs (Tables 21 and 22). The difference was even more marked when comparing the actual dollars returned to capital and management, $5,700 for the 80-1 and $5,300 for the 80-2 unit in 1955.

Potatoes were not very profitable to the operators on the 80-2 farms even at the 1955 selling prices of $1.85 per hundredweight. They covered costs, allowing $20.00 per acre charge for bare land, and left $213.00 to pay the manager for his own time and effort in growing 15 acres of this crop (Table 22).

Potatoes, on the other hand, proved a much better use of land on the 80-2 farms than field corn in 1955. The latter crop, even with a 50 hundredweight yield, lacked $22.00 per acre of equalling costs, not considering the land or the operator's management. The net deficit for the 29 acres in this crop during 1955 was $624.00 (Table 22).

These secondary crops that show losses for both 1955 and 1953 do, however, serve important functions for the operators of the 80-2 farms. Any excess they return above variable expenses helps absorb fixed costs on land that the operator cannot plant to cotton; the operator, thus, may have more net returns from the entire farm business with these crops than he would have without them, providing there is no other alternative crop that will perform any better.

Table 22. Gross Receipts, Costs, and Earnings by Crops and Total Farm, 1955 and 1953, 80-2 Farm in Upper San Joaquin Valley

Item	Cotton seed	Cotton lint	Potatoes	Field corn	Total farm
1	2	3	4	5	6
		1955			
Acres		33	15	29	
Yield		2.5 bales	290 cwt	50 cwt	
Production	35.1 tons	82.5 bales	4350 cwt	1450 cwt	
Price (dollars)	46.00	167.30	1.85	2.70	
	1,614.60	13,802.25			
		dollars			
Gross receipts		15,416.85	8,047.50	3,915.00	27,379.35
Costs (less int. on land)		9,344.86	7,521.04	4,540.20	21,406.10
Receipts minus cost		6,071.99	526.46	(625.20)	5,973.25
Land interest ($400 per acre at 5%)		690.00	315.00	595.00	1,600.00
Net		5,381.99	211.46	(1,220.20)	4,373.25
Add:					
Interest on fixed capital (includes land)					2,351.53
Operator's labor					1,089.52
Net farm income					7,814.30
Less:					
Operator's labor					2,500.00
Return to capital and management a/					5,314.30
Rate earned on investment a/					11.29%
		1953			
Acres		60	17	--	
Yield		2.1 bales	290 cwt		
Production	53.6 tons	126.0 bales	4930 cwt		
Price (dollars)	53.00	148.99	1.42		
	2,840.80	18,772.74			
		dollars			
Gross receipts		21,613.54	7,000.60		28,614.14
Costs (less int. on land)		14,882.32	8,552.39		23,434.71
Receipts minus costs		6,731.22	(1,551.79)		5,179.43
Land interest ($400 per acre at 5%)		1,230.00	370.00		1,600.00
Net		5,501.22	(1,921.79)		3,579.43
Add:					
Interest on fixed capital (includes land)					2,351.53
Operator's labor					1,255.18
Net farm income					7,186.14
Less:					
Operator's labor					2,500.00
Return to capital and management a/					4,686.14
Rate earned on investment a/					9.96%

a/ See Table 21 for method of calculation.

Selling prices for potatoes during both 1955 and 1953 were decidedly lower than those that usually prevailed during the period 1946-1955. Potato returns, therefore, were well below normal, and the crop depressed total farm earnings below the level that would have prevailed under more typical potato prices. The 1953 average price for early potatoes was the lowest since 1942, and in only one other year since that date has the price for this crop dropped to the 1955 level. It is because potato prices and earnings usually are higher that farmers in the Upper San Joaquin Valley have boosted production of this crop to levels of recent years. Potatoes are an established crop and not a recently adopted substitute crop for cotton that farmers plant on diverted cotton acres. Early potatoes have a long-standing status as one of the major crops in the Upper San Joaquin Valley.

The abnormal price and returns for potatoes in the two allotment years compared in this analysis distorts the normal relationship of the earnings from the 80-1 and the 80-2 farms. Ordinarily, under the typical price relations between cotton and potatoes during the last ten years, the 80-2 earnings would equal or exceed those from the 80-1 model. Relative prices in the future will determine whether this relationship is restored, or the one indicated by this analysis continues.

The excess of cash gross receipts over cash costs and expenses for the 80-2 farm amounted to $8,760 in 1955 and $7,970 in 1953.

Operators on the 80-3 Cotton-Barley Farms Failed to Find a Profitable Replacement Crop for Cotton in 1955; Consequently Their Earnings Dropped

Soil and water conditions limit the range of choices for the farmers operating the cotton-barley farms. These operators increased barley acres and added milo to the cropping system after acreage allotments. Neither of these crops produced enough gross receipts to result in a positive value for receipts minus

Table 23. Gross Receipts, Costs, and Earnings by Crops and Total Farm, 1955 and 1953, 80-3 Farm in Upper San Joaquin Valley

Item	Cotton seed	Cotton lint	Barley	Milo	Total farm
1	2	3	4	5	6
1955					
Acres		33	30	14	
Yield		1.8 bales	25 cwt	40 cwt	
Production	25.2 tons	59.4 bales	750 cwt	560 cwt	
Price (dollars)	46.00	167.30	2.15	2.30	
	1,159.20	9,937.62			
		dollars			
Gross receipts		11,096.82	1,612.50	1,288.00	13,997.32
Costs (less int. on land)		8,858.13	1,943.72	1,474.67	12,276.52
Receipts minus costs		2,238.69	(331.22)	(186.67)	1,720.80
Land interest ($240 per acre at 5%)		414.00	369.00	177.00	960.00
Net		1,824.69	(700.22)	(363.67)	760.80
Add:					
Interest on fixed capital (includes land)					2,315.28
Operator's labor					907.94
Net farm income					3,984.02
Less:					
Operator's labor					2,500.00
Return to capital and management a/					1,484.02
Rate earned on investment a/					4.43%
1953					
Acres		60	17	--	
Yield		1.5 bales	21 cwt		
Production	38.2 tons	90.0 bales	357 cwt		
Price (dollars)	53.00	148.99	2.70		
	2,024.60	13,409.10			
		dollars			
Gross receipts		15,433.70	963.90		16,397.60
Cost (less int. on land)		13,676.60	1,013.74		14,690.34
Receipts minus costs		1,757.10	(49.84)		1,707.26
Land interest ($240 per acre at 5%)		738.00	222.00		960.00
Net		1,019.10	(271.84)		747.26
Add:					
Interest on fixed capital (includes land)					2,315.28
Operator's labor					1,176.58
Net farm income					4,239.12
Less:					
Operator's labor					2,500.00
Return to capital and management a/					1,739.12
Rate earned on investment a/					5.19%

a/ See Table 21 for method of calculation.

costs, though barley came close in 1953 (Table 23). The advantage to the farmers in producing these grain crops lies in their function of covering a portion of the fixed costs, and thus helping to maintain total farm returns.

Cotton yields are lower on the 80-3 farm model than on either of the other two 80-acre units. These figures at 1.5 bales (750 pounds of lint) in 1953, and 1.8 bales (900 pounds of lint) in 1955, are slightly below the Kern County average figures of 770 and 955 pounds of lint, respectively in the two years. Due to the lower yields, cotton returned sharply less excess of receipts over costs to the farmers on the 80-3 farms than operators on either of the other two 80-acre models we analyzed (Tables 21-23).

The $1,900 net returns to management and capital on the 80-3 farms in 1953 represents about one-third of the comparable returns for the 80-1 farm model, and two-fifths of that to the 80-2 unit. The operators on the 80-3 farms were less successful in adjusting to acreage allotments, however and in 1955 their $1,700 return to capital and management stands at 29 and 32 per cent, respectively, of the returns to the other two models in the same year (Tables 21-23).

Rates of earning on capital investments for the 80-3 unit are roughly in line with the lower dollar earnings when compared with the profit rates on the other two models. The rate of return in 1955 was 3.65 per cent; this represents a drop of .55 per cent from the 1953 earnings of 4.20 per cent (Table 23).

Cash gross receipts exceeded cash expenses and costs for the 80-3 model by $4,560 in 1955 and $4,550 in 1953.

OPERATORS ON 160-ACRE FARMS WITH SATISFACTORY SOIL AND WATER CONDITIONS AND FAVORABLE PRICES FOR COTTON, POTATOES AND ALFALFA WERE ABLE TO MAINTAIN 1955 EARNINGS AT PREALLOTMENT LEVELS; OTHERS HAD CUTS IN INCOME

This section analyzes three 160-acre farm models in the Upper San Joaquin Valley. It undertakes to answer the same type of questions the previous section considered for the 80-acre units. Farms in the 160-acre class interval have certain advantages in resource use over the 80-acre, and there are 80 per cent more of these farms than occur in the 80-acre class interval.[a]

The 160-Acre Farms, Like the 80-Acre Models, Operated Less Intensively After Cotton Acreage Allotments

The three 160-acre models include one with water in short supply and relatively expensive, and two for which water is not a limiting factor in growing summer crops. These three units also show important soils variations. The 160-1, cotton-alfalfa seed-barley unit includes somewhat less productive soils than the other two units. The other models, the 160-2 cotton-potato-milo, and the 160-3 cotton-alfalfa-potato farms both are on grade 1 or 2 soils.

Before allotments, the 160-1 model included cotton, alfalfa seed and barley with cotton occupying two-thirds of the acres in crops (Table 24). This unit doubled the acreage of alfalfa seed, increased barley by about 60 per cent and increased fallow from 3 acres before to 15 after allotments. The 160-2 cotton-potato-milo farm had to find an alternate use for part of its potato land at the same time that the cotton allotment cut this crop back almost 50 per cent. Operators of this model increased the milo acreage and

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[a] The 160-acre class interval with 402 farms included 22 per cent of all cropland on Kern County farms with cotton allotments during 1954. There were more farms in this class than in any other class interval.

Table 24. Crops and Land Use on Typical 160-acre Farms, 1953-1955; 160-1, Cotton-Alfalfa Seed-Barley, 160-2, Cotton-Potatoes-Milo, 160-3, Cotton-Alfalfa-Potatoes, in Upper San Joaquin Valley

Year	Cotton	Alfalfa seed	Alfalfa	Potatoes	Milo	Field corn	Barley	Idle or fallow	Double crop	Total crop-land	Non culti-vated	Total land
1	2	3	4	5	6	7	8	9	10	11	12	13
160-1												
1953	100	15	--	--	--	--	30	3	--	148	12	160
1954	66	25	--	--	--	--	43	14	--	148	12	160
1955	55	30	--	--	--	--	48	15	--	148	12	160
Changes												
1953 to 1954	-34	+10	--	--	--	--	+13	+11	--	--	--	--
1954 to 1955	-11	+ 5	--	--	--	--	+ 5	+ 1	--	--	--	--
1953 to 1955	-45	+15	--	--	--	--	+18	+12	--	--	--	--
160-2												
1953	100	--	--	35	10	--	--	3	--	148	12	160
1954	66	--	15	25	35	--	35	7	35	148	12	160
1955	55	--	20	28	40	--	40	5	40	148	12	160
Changes												
1953 to 1954	-34	--	+15	-10	+25	--	+35	+4	+35	--	--	--
1954 to 1955	-11	--	+ 5	+ 3	+ 5	--	+ 5	-2	+ 5	--	--	--
1953 to 1955	-45	--	+20	- 7	+30	--	+40	+2	+40	--	--	--
160-3												
1953	100	--	25	20	--	--	--	3	--	148	12	160
1954	66	--	35	15	--	27[a]	--	5	--	148	12	160
1955	55	--	45	17	--	25	--	6	--	148	12	160
Changes												
1953 to 1954	-34	--	+10	- 5	--	+27	--	+2	--	--	--	--
1954 to 1955	-11	--	+10	+ 2	--	- 2	--	+1	--	--	--	--
1953 to 1955	-45	--	+20	- 3	--	+25	--	+3	--	--	--	--

[a] Sugar beets, an alternate for 15 acres in 1954.

added alfalfa and barley after the allotment with milo operated as a double crop operation following the barley (Table 24). Operators on the 160-3 farms expanded alfalfa acreage and added field corn as summer crops to utilize land diverted from cotton.

Operators of the 160-acre farming units, like those of the 80, failed to find replacement crops that will equal the gross or net returns from cotton. The acreage allotments therefore, resulted in less intensive crop production. The 160-1 model was the only one that showed any important increase in fallowed land. This shift reflects the shortage and high cost of water for summer crops. All three 160-acre farms indicate decreased gross receipts in 1955 as compared with 1953. The sharpest drop was on the 160-1 model where water and soil factors restricted the range of alternative crops. Price rises for alfalfa and potatoes were important in preventing sharper decreases on the other two units.

The same comments made for 80-acre farms regarding the opportunities that reduced cotton acres provide for operators to manage their cotton planting more effectively, and thus help increase yields, also apply to the operators on the 160-acre units. Here as for the 80-acre models, the allotments without exception left farmers in 1955 with less than half of their cropland in cotton.

Slight Increase in Fixed Costs Accompanied Cotton Acreage Cuts on 160-Acre Farms

All three farm models in the 160-acre class interval showed increases in total overhead or fixed costs between 1953 and 1955. The greatest amount of increase was the $480 rise for the 160-2 farms. The other two units showed gains of $175 and $205 for the 160-1 and 160-3 farms respectively (Tables 33-35).

Total current investments for the three 160-acre models, excluding land, ranged from $29,200 for the 160-1 to $30,050 for the 160-3 units (Table 25).

Table 25 Physical Resources and Investments for Typical 160-Acre Farms
(160-1, 160-2, 160-3) in Upper San Joaquin Valley
1955 Prices a/

Item and description	Size or capacity	Amount	New cost		Investment	
			per unit	total	per unit	total
1	2	3	4	5	6	7
Land:						
Total farm	160 acres					
Cultivated land	148 acres					
Improvements:						
Shop, storage		1		$2000.00		$1000.00
Tractor & equipment shed		1		1000.00		500.00
Fuel storage - gas	550 gal.	1		135.00		67.50
Fuel storage - diesel	350 gal.	1		110.00		55.00
Subtotal				3245.00		1622.50
Irrigation facilities:						
Pumping plant (40 HP)	650 gpm	2	$3200.00	6400.00	$1640.00	3280.00
Well, casing (180' lift)	12" diam.	2x400'	6.50	5200.00	3.25	2600.00
Subtotal				11600.00		5880.00
Distribution system:						
Reservoir	4.0 ac.'	1		80.00		40.00
Pipe	12"	5280'	.80	4224.00	.40	2112.00
Stands	6' x 36"	4	54.00	216.00	17.00	108.00
Vents	6' x 8"	4	4.20	16.80	2.10	8.40
Valves, alfalfa	12"	140	18.56	2598.40	9.28	1299.20
Row pipe	2"	400	1.50	600.00	.75	300.00
Siphons	1½"	200	1.27	254.00	.64	127.00
Subtotal				7989.20		3994.60
Power:						
Tracklayer	T-5D	1		7000.00		3850.00
Wheel tractor	W-2	2	3000.00	6000.00	2100.00	4200.00
Subtotal				13000.00		8050.00
Transportation:						
Pickup	3/4 ton	1		2300.00		1380.00
Equipment:						
Ditcher	4'	1		135.00		67.50
Scraper	4'	1		140.00		70.00
Plow, 2 way	2-16"	1		550.00		275.00
Disk-offset	9'	1		750.00		375.00
Spiketooth harrow	4' section	3	30.00	90.00	15.00	45.00
Cultipacker	12'	1		380.00		190.00
Lister planter	4 row	1		550.00		275.00
Cultivator	2 row	1		350.00		175.00
Cultivator	4 row	1		1000.00		500.00

(Continued on next page)

Table 25 continued

Item and description	Size or capacity	Amount	New cost		Investment	
			per unit	total	per unit	total
1	2	3	4	5	6	7
Equipment, continued:						
Cotton picker	1 row	1		$ 8700.00		$ 5220.00
Cotton trailer	5 bale	4	$400.00	1600.00	220.00	880.00
Stalk cutter	2 row	1		325.00		162.50
Additional equipment: 160-2 & 160-3 only						
Power mower b/	7'	1		350.00		175.00
Side delivery rake b/	8'	1		520.00		260.00
Potato planter				700.00		350.00
Steel roller				200.00		100.00
Equipment 160-1				14,570.00		8,235.00
Equipment 160-2						
1955				16,340.00		9,120.00
1953				15,440.00		8,670.00
Equipment 160-3				16,340.00		9,120.00
Total 160-1				$52,704.20		$29,162.10
Total 160-2						
1955				$54,474.20		$30,047.10
1953				$53,574.20		$29,597.10
Total 160-3				$54,474.20		$30,047.10

a/ The designations 160-1, 160-2, 160-3 refer to three variations found in the 160 acre size group.

b/ Purchased after 1953 for 160-2.

Table 26. Annual Irrigation Water Use by Crops, 1955 and 1953; 160-1, 160-2, 160-3 Farms in Upper San Joaquin Valley

Crop	1955				1953			
	Acres	Inches per acre	Total	Pumping hours required	Acres	Inches per acre	Total	Pumping hours required
1	2	3	4	5	6	7	8	9
160-1								
Cotton	55	42.00	2310.0	799.6	100	39.00	3900.0	1350.0
Alfalfa	30	30.00	900.0	311.5	15	30.00	450.0	155.8
Barley	48	14.40	691.2	239.3	30	14.40	432.0	149.5
Total acre-inches			3901.2	1350.4			4782.0	1655.3
Total acre-feet			325.1				398.5	
160-2								
Cotton	55	42.00	2310.0	799.6	100	39.00	3900.0	1350.0
Alfalfa	20	57.60	1152.0	398.8	-	-	-	-
Potatoes	28	36.00	1008.0	348.9	35	36.00	1260.0	436.2
Milo	40	27.00	1080.0	373.9	10	27.00	270.0	93.5
Barley	40	14.40	576.0	199.4	-	-	-	-
Total acre-inches			6126.0	2120.6			5430.0	1879.7
Total acre-feet			510.5				452.5	
160-3								
Cotton	55	42.00	2310.0	799.6	100	39.00	3900.0	1350.0
Alfalfa	45	57.60	2592.0	897.3	25	57.60	1440.0	498.5
Potatoes	17	36.00	612.0	211.9	20	36.00	720.0	249.2
Corn	25	42.00	1050.0	363.4	-	-	-	-
Total acre-inches			6564.0	2272.2			6060.0	2097.7
Total acre-feet			547.0				505.0	

Table 27. Costs for Irrigation Equipment, 1955 and 1953; 160-1, 160-2, 160-3 Farms in Upper San Joaquin Valley

A. Overhead 160-1, 160-2, 160-3

Item	Original cost	Life expected	Average investment	Annual Non Cash Overhead Costs			Taxes and Insur.	Total overhead
				Depr.	Interest	Total		
Pumping plant	6400.00	20	3280.00[a]	312.00	164.00	476.00	15.78	491.78
Well & casing	5200.00	20	2600.00	260.00	130.00	390.00	12.51	402.51
Reservoir	80.00	-	40.00	-	2.00	2.00	.19	2.19
Pipe line	4456.80	30	2228.40	148.56	111.42	259.98	10.72	270.70
Valves-alfalfa	2598.40	30	1299.20	86.61	64.96	151.57	6.25	157.82
Siphons	254.00	5	127.00	50.80	6.35	57.15	.61	57.76
Rowpipe	600.00	10	300.00	60.00	15.00	75.00	1.44	76.44
Total						1411.70		1459.20

B. Operating and total costs 160-1

Item	1955				1953			
	Operating costs			Total annual cost	Operating costs			Total annual cost
	Power & lube[b]	Repairs	Total		Power & lube[b]	Repairs	Total	
Pumping plant	2114.70	128.00	2242.70	2734.48	2362.26	128.00	2490.26	2982.04
Well & casing	-	-	-	402.51	-	-	-	402.51
Reservoir	-	4.00	4.00	6.19	-	4.00	4.00	6.19
Pipe line	-	22.28	22.28	292.98	-	22.28	22.28	292.98
Valves-alfalfa	-	12.99	12.99	170.81	-	12.99	12.99	170.81
Siphons	-	-	-	57.76	-	-	-	57.76
Rowpipe	-	-	-	76.44	-	-	-	76.44
Total			2281.97	3741.17			2529.53	3988.73
C. Operating and total costs 160-2								
Pumping plant	2643.65	128.00	2771.65	3263.43	2498.46	128.00	2626.46	3118.24
Well & casing	-	-	-	402.51	-	-	-	402.51
Reservoir	-	4.00	4.00	6.19	-	4.00	4.00	6.19
Pipe line	-	22.28	22.28	292.98	-	22.28	22.28	292.98
Valves-alfalfa	-	12.99	12.99	170.81	-	12.99	12.99	170.81
Siphons	-	-	-	57.76	-	-	-	57.76
Rowpipe	-	-	-	76.44	-	-	-	76.44
Total			2810.92	4270.12			2665.73	4124.93
D. Operating and total costs 160-3								
Pumping plant	2735.04	128.00	2863.04	3354.82	2629.90	128.00	2757.90	3249.68
Well & casing	-	-	-	402.51	-	-	-	402.51
Reservoir	-	4.00	4.00	6.19	-	4.00	4.00	6.19
Pipe line	-	22.28	22.28	292.98	-	22.28	22.28	292.98
Valves-alfalfa	-	12.99	12.99	170.81	-	12.99	12.99	170.81
Siphons	-	-	-	57.76	-	-	-	57.76
Rowpipe	-	-	-	76.44	-	-	-	76.44
Total			2902.31	4361.51			2797.17	4256.37

(continued on next page)

Table 27. continued

E. Unit Costs c/

		1955			1953		
		overhead	operating	total	overhead	operating	total
160-1	Cost per acre-inch	.374	.585	.959	.305	.529	.834
	Cost per acre-foot	4.488	7.019	11.507	3.661	6.348	10.009
160-2	Cost per acre inch	.238	.459	.697	.269	.491	.760
	Cost per acre-foot	2.858	5.506	8.364	3.225	5.891	9.116
160-3	Cost per acre-inch	.222	.442	.664	.241	.461	.702
	Cost per acre-foot	2.668	5.306	7.974	2.889	5.539	8.428

a/ Salvage value of $160.00 considered.

b/ Power for pumping irrigation water includes demand charge, varying with motor horsepower, and current consumed at rates varying with amount used.

c/ Water produced per farm in acre-feet:

	1955	1953
160-1	325.1	398.5
160-2	510.5	452.5
160-3	547.0	505.0

These are current values of the entire inventory of improvements and equipment, a considerable portion of which already has undergone substantial depreciation. The new replacement cost of this entire inventory, at 1955 prices, ranges from $52,700 to $54,500. The only one of these units that showed any change in the value of improvements and equipment between 1953 and 1955 was the 160-2 farm. This unit added equipment representing a new cost of $1,000 and a current investment of $500 additional between the two years (Table 25). The change to alfalfa production on the 160-2 model explains these additions.

There was a sharp distinction between the 160-1 and the other two 160-acre farms in the operator's range of choice in selecting alternative crops for cotton. The operator on the 160-1 farm expanded alfalfa seed as a replacement for cotton partly because it demands less water than other alternative summer crops. His final cropping organization indicates a reduction of about 75 acre feet in the demand for water as compared with pre-allotment acreages (Table 26). Operators on the other two farm models chose cotton replacement crops that involved increases in the amount of water used. One of the results of these differences is that overhead costs and total costs per acre foot for irrigation water increased for the 160-1 and decreased for the other two farms between 1953 and 1955 (Table 27). The higher costs for irrigation water on the 160-1 farm indicates one of the reasons that the operators of such units are hesitant to go heavily into summer crops with gross receipts sharply less than those expected from cotton. It requires a high gross receipts crop to cover water and other costs on these farms.

The change in crop organization accompanying a cotton acreage allotment brought reductions in tractor hour use on all three 160-acre farm units (Table 28). The amount of this reduction was sharpest for the 160-1 farm, as might be expected from the relative drastic cut in row crop acreage.

Table 28. Annual Tractor Hours, 1955 and 1953; 160-1, 160-2, and 160-3 Farms in Upper San Joaquin Valley

Crop	T-5D		W-2	
	1955	1953	1955	1953
1	2	3	4	5
160-1				
Cotton	90.20	164.00	385.55	701.00
Alfalfa seed	14.40	7.20	86.40	43.20
Barley	33.60	21.00	31.68	19.80
Total hours	138.20	192.20	503.63	764.00
160-2				
Cotton	90.20	164.00	380.05	691.00
Alfalfa	6.60	xxx	8.60	xxx
Potatoes	61.32	76.65	77.84	97.30
Milo	47.60	11.90	82.00	20.05
Barley	28.00	xxx	26.40	xxx
Total hours	233.72	252.55	574.89	808.35
160-3				
Cotton	90.20	164.00	385.55	701.00
Alfalfa	14.85	8.25	193.50	107.50
Potatoes	37.23	43.80	47.26	55.60
Field Corn	34.75	xxx	56.75	xxx
Total hours	177.03	216.05	683.06	864.10

Table 29. Overhead Costs for Tractors and Equipment, 1955 and 1953; 160-1, 160-2, 160-3, Farms in Upper San Joaquin Valley

Item	Original cost	Life expected	Salvage value	Average investment	Annual noncash overhead costs			Taxes and insurance	All over-head
					Depr.	Int.	Total		
1	2	3	4	5	6	7	8	9	10
T-5D	7000	10	700	3850	630.00	192.50	822.50	12.82	835.32
W-2 (2)	6000	6	2400	4200	600.00	210.00	810.00	13.99	823.99
Pickup 3/4 ton	2300	5	460	1380	368.00	69.00	437.00	54.60	491.60
4' ditcher	135	10	0	68	13.50	3.40	16.90	.23	17.13
4' scraper	140	10	0	70	14.00	3.50	17.50	.23	17.73
2 w/2-16" plow	550	10	0	272	55.00	13.75	68.75	.92	69.67
9' offset disk	750	10	0	375	75.00	18.75	93.75	1.25	95.00
12' spiketooth harrow	90	15	0	45	6.00	2.25	8.25	.15	8.40
12' cultipacker	380	10	0	190	38.00	9.50	47.50	.63	48.13
4 row lister planter	550	10	0	275	55.00	13.75	68.75	.92	69.67
2 row cultivator	350	10	0	175	35.00	8.75	43.75	.58	44.33
4 row cultivator	1000	10	0	500	100.00	25.00	125.00	1.66	126.66
1 row cotton picker	8700	5	1740	5220	1392.00	261.00	1653.00	17.38	1670.38
5 bale cotton trailer (4)	1600	5	160	880	288.00	44.00	332.00	2.93	334.93
2 row stalk cutter	325	10	0	163	32.50	8.15	40.65	.54	41.19
7' power mower	350	10	0	175	35.00	8.75	43.75	.58	44.33
8' side delivery rake	520	10	0	160	52.00	8.00	60.00	.53	60.53
2 row potato planter	700	15	0	350	46.67	17.50	64.17	1.17	65.34
6' steel roller	200	15	0	100	13.33	5.00	18.33	.33	18.66
Total 160-1							4585.30		4694.13
Total 160-2									
1955							4771.55		4882.99
1953							4667.80		4778.13
Total 160-3							4771.55		4882.99

Table 20. Overhead Costs for Tractors and Equipment, 1955 and 1959; 160-1, 160-2, 160-3, Farms in [illegible] 1959; [illegible]

[illegible]

Table 30. Operating Costs for Tractors and Equipment, 1955 and 1953;
160-1 Farms in Upper San Joaquin Valley

Item	1955					1953				
	Operating costs			Total annual cost	Cost per hour	Operating costs			Total annual cost	Cost per hour
	fuel and lube	repairs	total			fuel and lube	repairs	total		
T-5D	69.10	225.00	294.10	1129.42	8.172	96.10	225.00	321.10	1156.42	6.017
W-2 (2)	302.18	140.00	442.18	1266.17	2.514	458.40	190.00	648.40	1472.39	1.927
Pickup 3/4 ton	300.00	115.00	415.00	906.60	.091a/	300.00	115.00	415.00	906.60	.091a/
4' ditcher	-	4.05	4.05	21.18	1.476	-	4.05	4.05	21.18	.837
4' scraper	-	4.20	4.20	21.93	1.528	-	4.20	4.20	21.93	.867
2 w/2-16" plow	-	82.50	82.50	152.17	3.121	-	82.50	82.50	152.17	1.932
9' offset disk	-	112.50	112.50	207.50	2.441	-	112.50	112.50	207.50	2.229
12' spiketooth harrow	-	1.80	1.80	10.20	.241	-	1.80	1.80	10.20	.261
12' cultipacker	-	38.00	38.00	86.13	7.830	-	38.00	38.00	86.13	4.306
4 row lister planter	-	55.00	55.00	124.67	3.152	-	55.00	55.00	124.67	1.948
2 row cultivator	-	70.00	70.00	114.33	2.079	-	70.00	70.00	114.33	1.143
4 row cultivator	-	200.00	200.00	326.66	2.327	-	200.00	200.00	326.66	1.775
1 row cotton picker	-	1455.00	1455.00	3125.38	10.220	-	1455.00	1455.00	3125.38	5.621
5 bale cotton trailer (4)	-	48.00	48.00	382.93	4.642	-	48.00	48.00	382.93	2.553
2 row stalk cutter	-	16.25	16.25	57.44	2.089	-	16.25	16.25	57.44	1.149
Total 160-1			3238.58	7932.71				3471.80	8165.93	

a/ Cost per mile

Table 31. Operating Costs for Tractors and Equipment, 1955 and 1953;
160-2 Farms in Upper San Joaquin Valley

Item	1955					1953				
	Operating costs			Total annual cost	Cost per hour	Operating costs			Total annual cost	Cost per hour
	fuel and lube	repairs	total			fuel and lube	repairs	total		
T-5D	116.86	225.00	341.86	1177.18	5.037	126.28	225.00	351.28	1186.60	4.698
W-2 (2)	348.23	140.00	488.23	1312.22	2.261	491.01	190.00	681.01	1505.00	1.742
Pickup 3/4 ton	200.00	115.00	415.00	906.60	.091a/	300.00	115.00	415.00	906.60	.091a/
4' ditcher	-	4.05	4.05	21.18	.863	-	4.05	4.05	21.18	.694
4' scraper	-	4.20	4.20	21.93	.893	-	4.20	4.20	21.93	.719
2 w/2-16" plow	-	82.50	82.50	152.17	2.444	-	82.50	82.50	152.17	1.503
9' offset disk	-	112.50	112.50	207.50	1.412	-	112.50	112.50	207.50	1.718
12' spiketooth harrow	-	1.80	1.80	10.20	.165	-	1.80	1.80	10.20	.198
12' cultipacker	-	38.00	38.00	86.13	2.392	-	38.00	38.00	86.13	3.665
4 row lister planter	-	55.00	55.00	124.67	2.151	-	55.00	55.00	124.67	1.858
2 row cultivator	-	70.00	70.00	114.33	1.426	-	70.00	70.00	114.33	.869
4 row cultivator	-	200.00	200.00	326.66	2.403	-	200.00	200.00	326.66	1.928
1 row cotton picker	-	1455.00	1455.00	3125.38	10.220	-	1455.00	1455.00	3125.38	5.621
5 bale cotton trailer (4)	-	48.00	48.00	382.93	4.642	-	48.00	48.00	382.93	2.553
2 row stalk cutter	-	16.25	16.25	57.44	2.089	-	16.25	16.25	57.44	1.149
7' power mower	-	35.00	35.00	79.33	1.828	-	-	-	-	-
8' side delivery rake	-	52.00	52.00	112.53	2.772	-	-	-	-	-
2 row potato planter	-	70.00	70.00	135.34	3.776	-	70.00	70.00	135.34	3.021
6' steel roller	-	10.00	10.00	28.66	3.412	-	10.00	10.00	28.66	2.730
Total 160-2			3499.39	8382.38				3614.59b/	8392.72b/	

a/ per mile.

b/ These totals exclude 7' power mower and 8' S.D. rake figures as equipment was purchased after 1953.

Table 32. Operating Costs for Tractors and Equipment, 1955 and 1953; 160-3 Farms in Upper San Joaquin Valley

Item	1955					1953				
	Operating costs			Total annual cost	Cost per hour	Operating costs			Total annual cost	Cost per hour
	fuel and lube	repairs	total			fuel and lube	repairs	total		
T-5D	88.52	225.00	313.52	1148.84	6.490	108.02	225.00	333.02	1168.34	5.408
W-2 (2)	409.84	140.00	549.84	1373.83	2.011	518.46	190.00	708.46	1532.45	1.773
Pickup 3/4 ton	300.00	115.00	415.00	906.60	.091a/	300.00	115.00	415.00	906.60	.091a/
4' ditcher	-	4.05	4.05	21.18	1.036	-	4.05	4.05	21.18	.784
4' scraper	-	4.20	4.20	21.93	1.072	-	4.20	4.20	21.93	.812
2 w/2-16" plow	-	82.50	82.50	152.17	2.092	-	82.50	82.50	152.17	1.691
9' offset disk	-	112.50	112.50	207.50	2.336	-	112.50	112.50	207.50	2.095
12' spiketooth harrow	-	1.80	1.80	10.20	.313	-	1.80	1.80	10.20	.246
12' cultipacker	-	38.00	38.00	86.13	7.830	-	38.00	38.00	86.13	4.306
4 row lister planter	-	55.00	55.00	124.67	2.529	-	55.00	55.00	124.67	2.044
2 row cultivator	-	70.00	70.00	114.33	1.626	-	70.00	70.00	114.33	.969
4 row cultivator	-	200.00	200.00	326.66	2.784	-	200.00	200.00	326.66	2.081
1 row cotton picker	-	1455.00	1455.00	3125.38	10.220	-	1455.00	1455.00	3125.38	5.621
5 bale cotton trailer (4)	-	48.00	48.00	382.93	4.642	-	48.00	48.00	382.93	2.553
2 row stalk cutter	-	16.25	16.25	57.44	2.089	-	16.25	16.25	57.44	1.149
7' power mower	-	35.00	35.00	79.33	.812	-	35.00	35.00	79.33	1.462
8' side delivery rake	-	52.00	52.00	112.53	1.232	-	52.00	52.00	112.53	2.217
2 row potato planter	-	70.00	70.00	135.34	6.220	-	70.00	70.00	135.34	5.287
6' steel roller	-	10.00	10.00	28.66	5.620	-	10.00	10.00	28.66	4.777
Total 160-3			3532.66	8415.65				3710.78	8593.77	

a/ Per mile

The results of these reductions in power unit use was to increase the cost per hour for overhead and total annual costs for this equipment (Tables 29-32). The amount of the increase, like the cut in hours of use, was greatest for the 160-1 farms.

As indicated by their considerably higher investments, operators of the 160 acre farms in the Upper San Joaquin Valley owned more farming equipment than those on the 80-acre farms. In the absence of cotton acreage restrictions, this fact reflects an advantage of the 160 farms over the 80. Because they are larger, they are able to utilize larger-capacity equipment, and to include certain items that may be uneconomic on the smaller units. The cotton harvester is a good example of the latter category. This machine enables crop growers to cut costs and to increase profits, all factors considered, if they can use an important faction of the seasonal capacity for this machine.[a]

The acreage at or above which a mechanical harvester is profitable lies somewhere between 80 and 100 acres of cotton, considering cotton yields in the Upper San Joaquin Valley. The typical cotton acreage on the 160-acre farm was 100 acres before allotment, and practically all of the operators on these 160-acre farms owned cotton harvesters. The reduction to 55 acres of cotton on the 160-acre models in 1955 makes it very difficult for the operator to use adequate capacity of his cotton harvester to permit economies from machine harvesting. Operators who already own such equipment undoubtedly will use it as long as they think they can profit by doing so. The outlook does not appear promising under present allotment levels, however, for 160-acre operators to buy new replacement cotton harvesters when present ones are worn out, considering physical features and price relationships related to existing models.

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a/ Hedges, Trimble R., and Warren R. Bailey. Economics of Mechanical Cotton Harvesting, California Agricultural Experiment Station Bulletin No. 743.

Operators on 160-acre farms also increased fertilizer and irrigation water in 1955 over 1953 applications. These added variable inputs go far in explaining the yield increases of the 160-acre farms. Such gains in crop yields are comparable to those on the 80-acre units. The evidence from most growers returning questionnaires and those reporting in interviews, indicates that operators on the 160-acre units increased fertilizer about 20 pounds nitrogen equivalent between 1953 and 1955. This represents a gain from 100 pounds in the earlier year to 120 pounds in the latter one. The increase in the amount of irrigation water was the same as for those of the 80-acre operators -- 3 acre-inches per acre. Interviewees operating the 160-acre units also stressed the importance of improved timing for various cultural operations, and the gain from better soils management as factors explaining cotton yields increases.

Total input costs for producing cotton were quite high for all three 160-acre models, but highest on the 160-1 farms. As might be expected, fixed or overhead costs per acre went up sharply between 1953 and 1955 for all three 160-acre units. The sharpest actual and percentage increase was on the 160-1 farm (Tables 33-35). This unit was the one that had the least success in finding profitable crops to utilize the acres diverted from cotton. The reduced cotton acreage, therefore, had to carry a larger proportion of the original fixed cost than was true for the other units.

Variable expenses also increased, due to added inputs already indicated above.

There was considerable variation among other crops as to the changes in cost per acre before and after allotments. In general, the increases in fixed costs were much less for alternate crops than for cotton, and these costs declined where sharp acreage increases occurred, as in milo on the 160-2 and alfalfa on the 160-3 models (Tables 34 and 35).

Table 33. Input Costs by Crops and Total Farm, 1955 and 1953, 160-1 Farm in Upper San Joaquin Valley

	1955						
Item	Cotton 55 acres		Alfalfa Seed 30 acres		Barley 48 acres		All crops total 133 acres
	per acre	total	per acre	total	per acre	total	
1	2	3	4	5	6	7	8
Overhead	96.62	5,400.58	45.50	1,439.40	24.69	1,259.61	8,099.59
Operating:							
Power	14.11	776.05	4.45	133.50	4.30	206.40	1,115.95
Equipment	34.94	1,921.70	3.20	96.00	1.12	53.76	2,071.46
Materials	42.35	2,329.25	17.55	526.50	11.62	557.76	3,413.51
Labor	33.52	1,843.46	16.44	493.24	8.78	421.51	2,758.21
Contracts	94.53	5,199.22	81.26	2,437.68	12.87	617.75	8,254.65
Total operating	219.45	12,069.68	122.90	3,686.92	38.69	1,857.18	17,613.78
Total cost	316.07	17,470.26	168.40	5,126.32	63.38	3,116.79	25,713.37
	1953						
	100 acres		15 acres		30 acres		145 acres
Overhead	65.90	6,626.55	38.31	618.72	21.46	680.31	7,925.58
Operating:							
Power	12.12	1,212.00	3.86	57.90	3.44	103.20	1,373.10
Equipment	20.15	3,432.00	2.56	38.40	1.05	31.50	3,501.90
Materials	34.60	3,460.00	15.87	238.05	10.82	324.60	4,022.65
Labor	31.73	3,172.94	16.11	241.70	8.45	253.60	3,668.24
Contracts	86.22	8,621.56	81.17	1,217.12	11.87	368.14	10,206.82
Total operating	184.82	19,898.50	119.57	1,793.17	35.63	1,081.04	22,772.71
Total cost	250.72	26,525.05	158.38	2,411.89	57.09	1,761.35	30,698.29

Table 34. Input Costs by Crops and Total Farm, 1955 and 1953, 160-2 Farm in Upper San Joaquin Valley

	1955										
Item	Cotton 55 acres		Alfalfa 20 acres		Potatoes 28 acres		Milo 40 acres		Barley 40 acres		All crops total 143 acres
	per acre	total	per acre	total	per acre	total	per acre	total	per acre	total	
1	2	3	4	5	6	7	8	9	10	11	12
Total overhead	82.28	4,565.92	49.75	1,025.01	41.62	1,195.36	24.18	982.01	16.12	659.61	8,427.91
Operating:											
Power	11.84	651.20	5.29	105.80	9.73	272.44	5.23	209.20	3.34	133.60	1,372.24
Equipment	32.28	1,775.40	4.35	87.00	5.74	160.72	3.59	143.60	.73	29.20	2,195.92
Materials	21.35	1,174.25	26.44	528.80	147.32	4,124.96	13.19	527.60	9.81	392.40	6,748.01
Labor	32.84	1,806.22	29.29	585.71	22.42	627.73	15.95	638.19	8.49	339.41	3,997.26
Contracts	100.19	5,510.47	36.75	735.00	268.19	7,509.29	15.68	627.24	12.65	505.95	14,887.95
Total operating	198.50	10,917.54	102.12	2,042.31	453.40	12,695.14	53.64	2,145.83	35.02	1,400.56	29,201.38
Total cost	280.78	15,483.46	151.87	3,067.32	495.02	13,890.50	77.82	3,127.84	51.14	2,060.17	37,629.29
	1953										
	100 acres		--		35 acres		10 acres		--		145 acres
Total overhead	61.80	6,216.55			39.06	1,403.62	29.04	326.90			7,947.07
Operating:											
Power	10.86	1,086.00			8.92	312.20	4.87	48.70			1,446.90
Equipment	19.67	1,967.00			4.68	163.80	3.51	35.10			2,165.90
Materials	21.22	2,122.00			148.48	5,196.80	14.06	140.60			7,459.40
Labor	31.58	3,158.13			22.39	783.55	15.92	159.23			4,100.91
Contracts	90.99	9,099.14			268.17	9,385.93	15.90	158.98			18,644.05
Total operating	174.32	17,432.27			452.64	15,842.28	54.26	542.61			33,817.16
Total cost	236.12	23,648.82			491.70	17,245.90	83.30	869.51			41,764.23

Table 35. Input Costs by Crops and Total Farm, 1955 and 1953, 160-3 Farm in Upper San Joaquin Valley

					1955				
	Cotton 55 acres		Alfalfa 45 acres		Potatoes 17 acres		Field corn 25 acres		All crops total
Item	per acre	total	per acre	total	per acre	total	per acre	total	142 acres
1	2	3	4	5	6	7	8	9	10
Total overhead	84.55	4,700.80	46.15	2,113.17	42.71	756.08	35.57	919.26	8,489.31
Operating:									
Power	12.81	704.55	5.51	247.95	8.25	140.25	6.42	160.50	1,253.25
Equipment	35.29	1,940.95	1.94	87.30	8.25	140.25	4.55	113.75	2,282.25
Materials	20.63	1,134.65	25.46	1,145.70	146.71	2,494.07	21.16	529.00	5,303.42
Labor	33.71	1,853.93	29.52	1,328.32	22.65	385.05	22.81	570.26	4,137.56
Contracts	100.28	5,515.17	36.75	1,653.75	268.20	4,559.42	56.36	1,409.07	13,137.41
Total operating	202.72	11,149.25	99.18	4,463.02	454.06	7,719.04	111.30	2,782.58	26,113.89
Total cost	287.38	15,850.05	145.33	6,576.19	496.77	8,475.12	146.87	3,701.84	34,603.20
					1953				
	100 acres		25 acres		20 acres		--		145 acres
Total overhead	62.16	6,252.55	47.17	1,215.70	39.00	816.51			8,284.76
Operating:									
Power	11.70	1,170.00	5.15	128.75	7.38	147.60			1,446.35
Equipment	20.86	2,086.00	3.48	87.00	6.82	136.40			2,309.40
Materials	20.05	2,005.00	26.55	663.75	147.40	2,948.00			5,616.75
Labor	31.69	3,168.71	29.25	731.34	22.39	447.80			4,347.85
Contracts	91.02	9,101.52	36.75	918.75	268.20	5,363.13			15,383.40
Total operating	175.32	17,531.23	101.18	2,529.59	452.15	9,042.93			29,103.75
Total cost	237.48	23,783.78	148.35	3,745.29	491.15	9,859.44			37,388.51

Table 36. Gross Receipts, Costs, and Earnings by Crops and Total Farm, 1955 and 1953, 160-1 Farm in Upper San Joaquin Valley

Item 1	Cotton seed 2	Cotton lint 3	Alfalfa seed 4	Barley 5	Total farm 6
			1955		
Acres		55	30	48	
Yield		2.1 bale	550 lbs.	25 cwt	
Production	49.1 tons	115.5 bale	16,500 lbs.	1,200 cwt	
Price (Dollars)	46.00	167.30	.24	2.15	
	2,258.60	19,323.15			
Gross receipts		$21,581.75	3,960.00	2,580.00	28,121.75
Costs (less interest on land)		17,470.26	5,126.32	3,116.79	25,713.37
Receipts minus costs		4,111.49	(1,166.32)	(536.79)	2,408.38
Land interest ($240 per acre at 5%)		828.00	444.00	648.00	1,920.00
Net		3,283.49	(1,610.32)	(1,184.79)	488.38
Add:					
Interest on fixed capital (includes land)					3,378.15
Operator's labor					935.17
Net farm income					4,801.70
Less:					
Operator's labor					2,500.00
Return to capital and management a/					2,301.70
Rate earned on investment a/					3.41%
			1953		
Acres		100	15	30	
Yield		1.75 bale	550 lbs.	21 cwt	
Production	74.4 tons	175.0 bale	8,250 lbs.	630 cwt	
Price (Dollars)	53.00	148.99	.28	2.70	
	3,943.20	26,073.25			
Gross receipts		$30,016.45	2,310.00	1,701.00	34,027.45
Costs (less interest on land)		26,525.05	2,411.89	1,761.35	30,698.29
Receipts minus costs		3,491.40	(101.89)	(60.35)	3,329.16
Land interest ($240 per acre at 5%)		1,296.00	228.00	396.00	1,920.00
Net		2,195.40	(329.89)	(456.35)	1,409.16
Add:					
Interest on fixed capital (includes land)					3,378.15
Operator's labor					1,326.65
Net farm income					6,113.96
Less:					
Operator's labor					2,500.00
Return to capital and management a/					3,613.96
Rate earned on investment a/					5.35%

a/ See Table 21 for method of calculation.

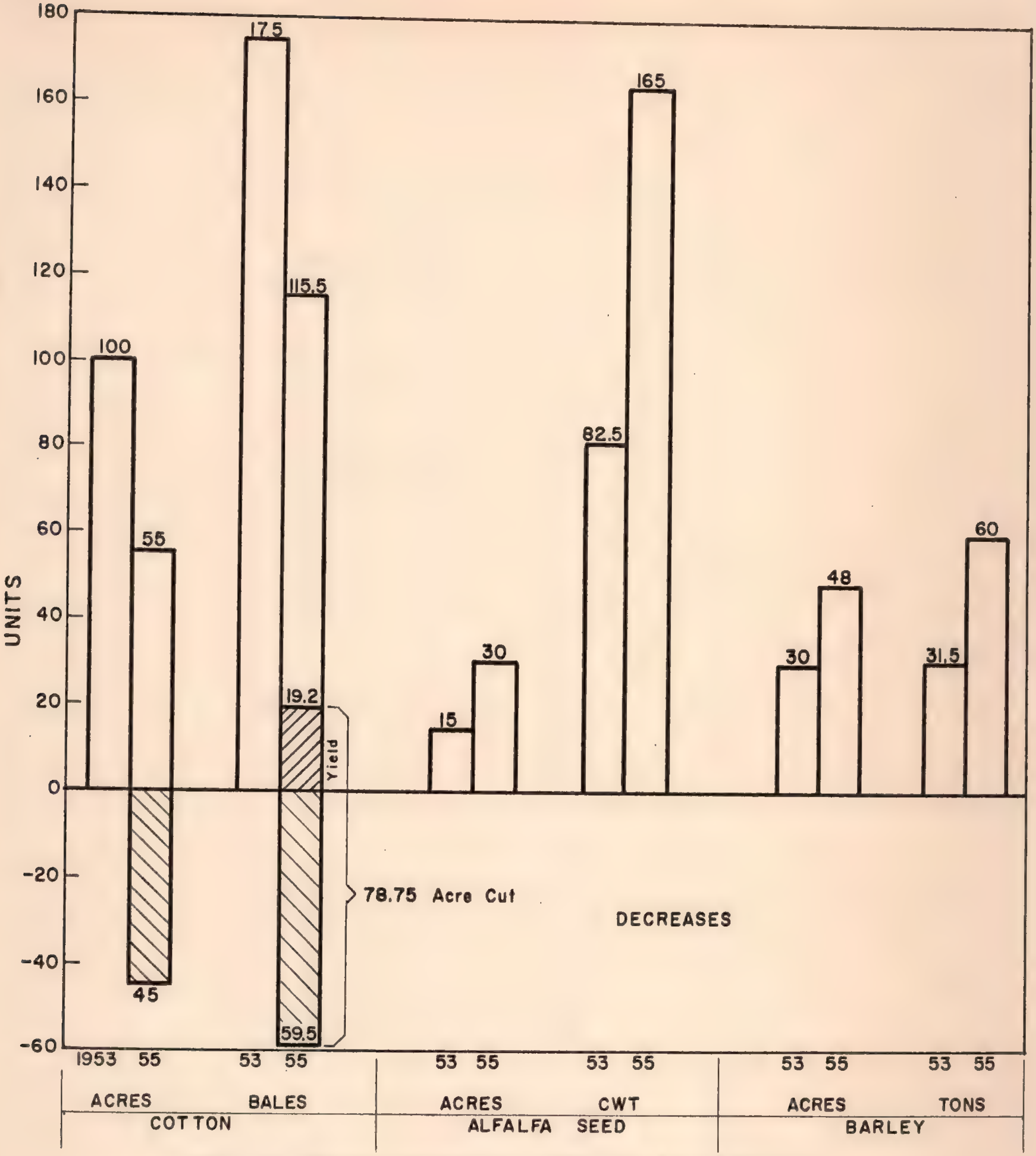
Sharp Earnings Drop Accompanied Acre Allotment on 160-1 Farm With Available Alternatives Decidedly Less Profitable Than Cotton; Operators Substituted Alfalfa Seed and Grain for Diverted Cotton Acres.

The 160-1 model in this analysis represents farms with limited and relatively expensive irrigation water supplies on land approximating grade three under the Storie Index rating. Prior to allotments, the operators of such farms emphasized cotton and planted a limited acreage in alfalfa seed as a companion summer crop. The balance of their crop acres was in winter barley (Table 24 and Figure VII). The limits on available water, plus its cost, discouraged these growers from turning to summer feed crops such as alfalfa and field corn. As a result, they doubled their alfalfa seed acreage and increased barley by 60 per cent. Growers in the Upper San Joaquin Valley regard both of these crops as economical in water use. The barley crop demands water only during the winter season and thus does not compete directly with summer crops.

Operators on the 160-1 model also were successful in increasing cotton yields, but they started from a lower point than those on the farms with higher quality soils. These growers were producing about one bale and three-quarters of cotton per acre before the allotment program; they succeeded in increasing yields to slightly over two bales per acre (Table 36).

As a result, they produced 19 more bales of cotton in 1955 than they would have produced on the same acres with the 1953 yield. This offsets about one-fourth of the influence of cotton acreage reduction for these growers. Alfalfa seed yields remained the same after allotments, and therefore the operators on the 160-1 farms doubled production by doubling acres. Barley yields increased slightly and the gain in production, therefore, was slightly greater than the proportion of acreage increase. (Table 36 and Figure VII).

Figure VII. Changes in Acres and Production; Cotton and Other Crops on 160–1 Farms in Upper San Joaquin Valley, 1953–1955



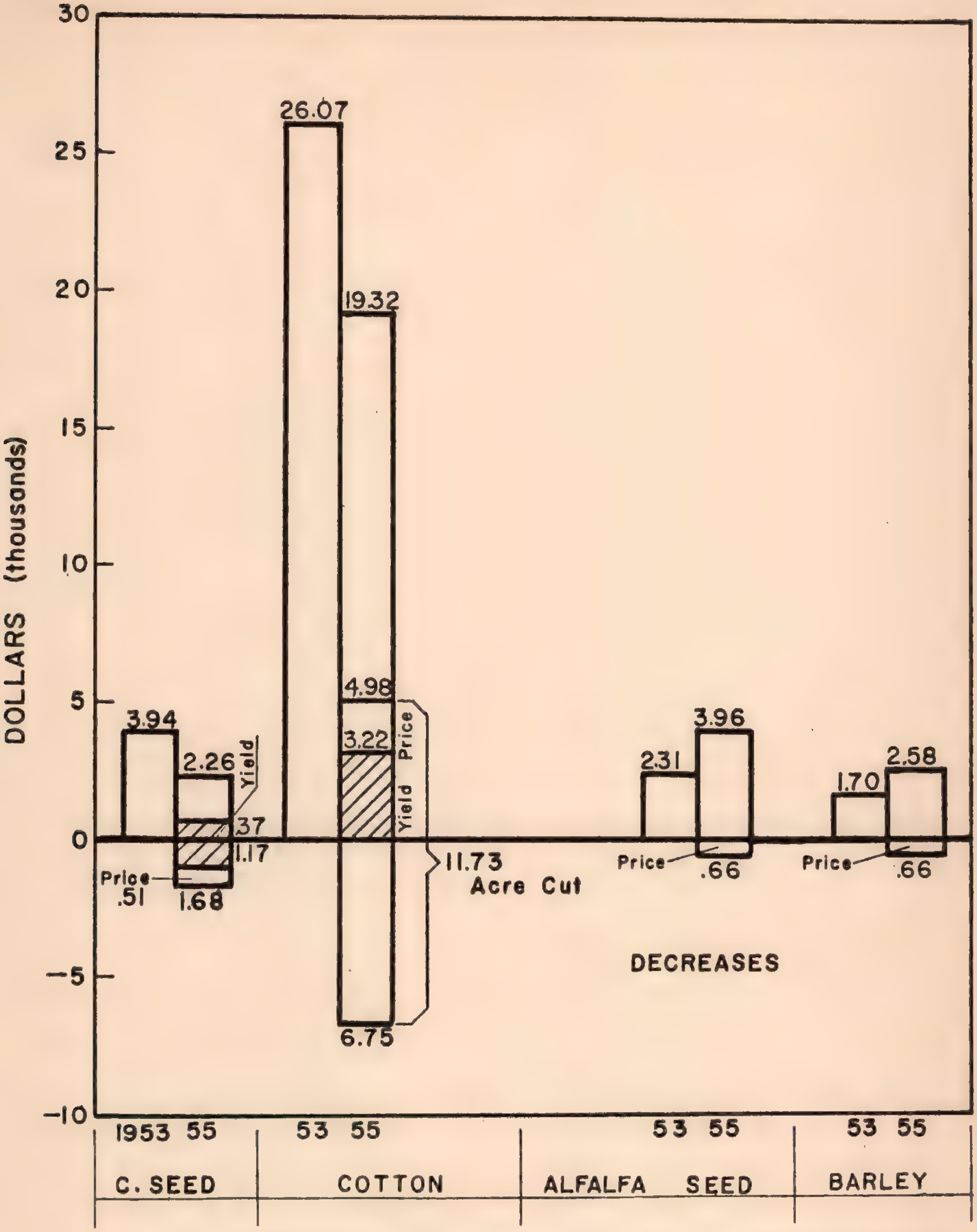
Growers on the 160-acre farms with soil and water problems planted their 45 diverted acres to alfalfa seed and barley.

Changes in Gross Receipts Reflect Acreage Cuts for Cotton and Increases for Alfalfa Seed and Barley. Cotton Prices Rose; Those for Cotton Seed, Alfalfa Seed and Barley Dropped. Total farm gross receipts for the 160-1 farms reflect a combination of acreage reductions, yield increases and higher prices for cotton plus a drop in cotton seed prices, as did those for the 80-acre models (Figure VIII). The substantial increases in physical production of alfalfa seed and barley, however, were offset in important degrees by price declines for these two products in 1955 (Table 36 and Figure VIII). Alfalfa seed prices dropped from 28 to 24 cents between these two seasons, while barley prices dropped by 55 cents from the 1953 level of $2.70 per cwt. Both these declines reflect the impact of external forces on the individual farm market situation. Very heavy increases in production in alfalfa seed occurred between 1953 and 1955 and price drops accompanied this increase. A combination of increases in feed grains of all kinds, plus reduced price support levels, accounts for the reduction in barley price.

Cotton fared best among the alternative crops as a result of these various influences. Had the operators on the 160-1 farm produced in 1955 at the 1953 yield levels on the reduced acres and sold at the 1953 prices, they would have sustained drops of nearly $12,000 in gross receipts from cotton (Figure VIII). The combined influence of higher yields and prices in 1955 limited this drop to $6,750. The yield gains explain about two-thirds of this with the remainder being due to prices.

Cotton Net Returns in 1955 Exceeded 1953 Earnings but Total Farm Earnings Dropped in 1955 Due to Unfavorable Returns from Other Crops. The 160-1 farm returned $2,400 in 1955 to pay for the use of land and operator's management (Table 36 and Figure IX). The receipts minus costs from cotton alone were $4,100, but alfalfa seed and barley showed negative values of $1,200 and $500

Figure VIII. Changes in Gross Receipts; Cotton and Other Crops on 160-1 Farms in Upper San Joaquin Valley, 1953–1955 (in thousands dollars)



Higher yields and prices for cotton lessened the impact of cotton allotments on gross receipts for the 160-acre farms, but price declines for alfalfa seed and barley increased the difficulty of finding profitable crops for the diverted acres.

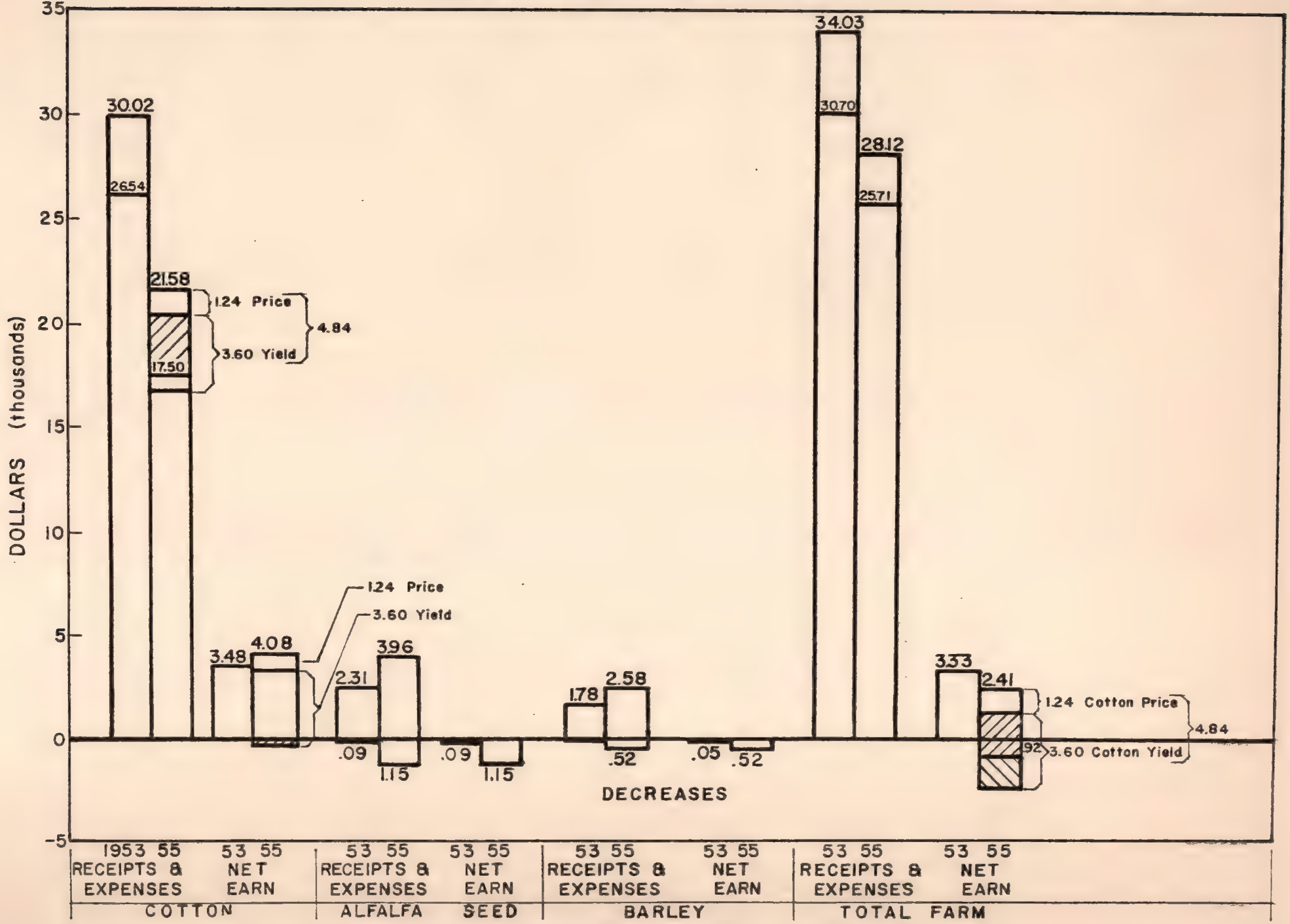
respectively. This 1955 figure for receipts minus costs represents a drop of about 30 per cent from 1953. Cotton receipts minus costs did not total as much in 1953 as in 1955, but there were smaller negative returns on the other two crops to deduct from the cotton earnings. The cotton enterprise was the only one on this 160-1 farm to show an excess of receipts over costs in both 1955 and 1953 (Table 36 and Figure IX). The other two enterprises expanded between the two seasons and the result was that cotton had about $1,700 of negative returns to offset in 1955, as compared with $150 in 1953. The drop in alfalfa seed and barley prices aggravated this situation. Barley would have shown a favorable balance in 1955 had the production in that year sold at 1953 prices, while the deficit for alfalfa seed would have been reduced by more than half.

The difference between positive and negative returns for cotton itself in 1955 lies in the yield and price gains between the two seasons. Total cotton and cottonseed receipts were larger by $4,800 in 1955 than they would have been had the 1953 yields and prices prevailed (Figure IX). The gain due to these factors exceeds the $2,400 net returns to the total farm business by about $2,400. The latter would have been the negative net return from crops to pay for use of land and management under 1953 yield and price conditions.

Operators on the 160-1 Farming Units Have Difficulty in Adjusting to Cotton Acreage Allotments. This analysis uses a valuation of $240 per acre on a bare land basis, for farm land on a 160-1 farm. The cost for interest on investment in this land amounts to $1,920 when calculated at 5 per cent. Returns to capital and management amounted to $3,600 in 1953 and $2,300 in 1955. These dollar values represent 5.35 per cent and 3.41 per cent return on total investment for 1953 and 1955, respectively (Table 36).

The same questions raised earlier relative to land values and profit measures for the 80-acre farms also apply here. It was not possible to

Figure IX. Changes in Gross Receipts, Expenses, and Net Returns on 160–1 Farms in Upper San Joaquin Valley, 1953–1955 (in thousands dollars)



Both cotton and the entire farm would have shown net losses in 1955 on the 160-acre farms with soil and water problems except for the increased cotton yields and prices.

obtain precise and reliable market values for land on the 160-1 farm. Net cash income, or the difference between gross cash receipts and cash costs and expenses on the 160-1 model amounted to $8,721 in 1955 and to $9,467 in 1953.

The analysis demonstrates clearly that cotton is the key to profitable farming on the 160-1 farm under the price conditions prevailing in 1953 and 1955. The allotment brought a sharp drop in gross receipts and only the success of operators in increasing yields plus higher 1955 prices avoided losses on cotton as well as on other enterprises in 1955. Farm operators on grade three soils and faced with limited irrigation water supplies, at relatively high costs, find it quite difficult to make profitable adjustments to cotton acreage allotments.

The 160-Acre Cotton Potato Farm Earned Almost Twice as High a Rate of Profit in 1953 as the 160-1 Farms and a Wider Margin in 1955

The 160-2 model in the Upper San Joaquin Valley is located on grade one land and has adequate supplies of water. This water cost per acre foot was 10 per cent less than the cost on the 160-1 unit in 1953 and about 30 per cent less in 1955.

In comparison with the 160-1 model, the 160-2 farm has several distinct advantages: cotton yields are considerably higher; potatoes are a profitable alternative crop; milo and barley in double crop sequence serve to absorb some of the fixed costs that otherwise would have to be charged against the first choice crops.

Cotton was responsible for about two-thirds of the gross receipts in 1953 and one-half in 1955. In 1953, the receipts minus costs for cotton at $12,500 exceeded the amount for the entire farm by about $3,000. This latter value represents the $3,000 deficit resulting from potatoes and milo

[illegible]

[illegible]

[illegible]

The [illegible] and less extensive growth of [illegible] 10 per cent less [illegible] cent less in [illegible].

In comparison with the [illegible] attractive [illegible] some of the [illegible] cotton crops.

[illegible]

Table 37. Gross Receipts, Costs, and Earnings by Crops and Total Farm, 1955 and 1953, 160-2 Farm in Upper San Joaquin Valley

Item 1	Cotton seed 2	Cotton lint 3	Alfalfa 4	Potatoes 5	Milo 6	Barley 7	Total farm 8
				1955			
Acres		55	20	28	40	40	
Yield		2.5 bales	7.0 tons	290 cwt	30 cwt	25 cwt	
Production	58.4 tons	137.5 bales	140 tons	8120 cwt	1200 cwt	1000 cwt	
Price (dollars)	46.00	167.30	26.00	1.85	2.30	2.15	
	2,686.40	23,003.75		Dollars			
Gross receipts		25,690.15	3,640.00	15,022.00	2,760.00	2,150.00	49,262.15
Costs(less int.on land)		15,483.46	3,067.32	13,890.50	3,127.84	2,060.17	37,629.29
Receipts minus costs		10,206.69	572.68	1,131.50	(367.84)	89.83	11,632.86
Land int. ($400 per acre at 5%)		1,270.00	457.00	617.00	428.00	428.00	3,200.00
Net		8,936.69	115.68	514.50	(795.84)	(338.17)	8,432.86
		Add:					
		Interest on Fixed Capital (includes land)					4,697.40
		Operator's labor					1,196.61
		Net farm income					14,326.87
		Less:					
		Operator's labor					2,500.00
		Return to capital and management a/					11,826.87
		Rate earned on investment a/					12.58%
				1953			
Acres		100	--	35	10	--	
Yield		2.1 bales		290 cwt	30 cwt		
Production	89.2 tons	210 bales		10,150 cwt	300 cwt		
Price (dollars)	53.00	148.99		1.42	2.75		
	4,727.60	31,287.90		Dollars			
Gross receipts		36,015.50		14,413.00	825.00		51,253.50
Costs(less int.on land)		23,648.82		17,245.90	869.51		41,764.23
Receipts minus costs		12,366.68		(2,832.90)	(44.51)		9,489.27
Land int. ($400 per acre at 5%)		2,150.00		775.00	275.00		3,200.00
Net		10,216.68		(3,607.90)	(319.51)		6,289.27
		Add:					
		Interest on fixed capital (includes land)					4,680.65
		Operator's labor					1,440.25
		Net farm income					12,410.17
		Less:					
		Operator's labor					2,500.00
		Return to capital and management a/					9,910.17
		Rate earned on investment a/					10.59%

a/ See Table 21 for method of calculation.

Table 38. Gross Receipts, Costs, and Earnings by Crops and Total Farm, 1955 and 1953, 160-3 Farm in Upper San Joaquin Valley

Item	Cotton seed	Cotton lint	Alfalfa	Potatoes	Field corn	Total farm
1	2	3	4	5	6	7
1955						
Acres		55	45	17	25	
Yield		2.5 bale	7.0 tons	290 cwt	50 cwt	
Production	58.4 tons	137.5 bale	315 tons	4,930 cwt	1,250 cwt	
Price (dollars)	46.00	167.30	26.00	1.85	2.70	
	2,686.40	$23,003.75				
Gross receipts		$25,690.15	8,190.00	9,120.50	3,375.00	46,375.65
Costs (less int. on land)		15,850.05	6,576.19	8,475.12	3,701.84	34,603.20
Receipts minus costs		9,840.10	1,613.81	645.38	(326.84)	11,772.45
Land int. ($400 per acre at 5%)		1,280.00	960.00	400.00	560.00	3,200.00
Net		8,560.10	653.81	245.38	(886.84)	8,572.45
Add:						
Interest on fixed capital (includes land)						4,697.40
Operator's labor						1,175.63
Net farm income						14,445.48
Less:						
Operator's labor						2,500.00
Return to capital and management a/						11,945.48
Rate earned on investment a/						12.70%
1953						
Acres		100	25	20	--	
Yield		2.1 bale	7.0 tons	290 cwt		
Production	89.2 tons	210 bale	175 tons	5,800 cwt		
Price (dollars)	53.00	148.99	21.60	1.42		
	4,727.60	31,287.90				
Gross receipts		$36,015.50	3,780.00	8,236.00		48,031.50
Costs (less int. on land)		23,783.78	3,745.29	9,859.44		37,388.51
Receipts minus costs		12,231.72	34.71	(1,623.44)		10,642.99
Land int. ($400 per acre at 5%)		2,150.00	575.00	475.00		3,200.00
Net		10,081.72	(540.29)	(2,098.44)		7,442.99
Add:						
Interest on fixed capital (includes land)						4,697.40
Operator's labor						1,453.30
Net farm income						13,593.69
Less:						
Operator's labor						2,500.00
Return to capital and management a/						11,093.69
Rate earned on investment a/						11.80%

a/ See Table 21 for method of calculation.

(Table 37). The same low prices and reduced gross receipts that explain potato losses in 1953 on the 80-acre farm explains this situation on the 160-2 model. The operators of this unit were more successful with their alternative crops in 1955. Milo was the only one showing a deficit for receipts minus cost. The total farm value was $11,600 of which $10,100 came from cotton (Table 37).

Returns to capital and management on the 160-2 farms were $11,800 in 1955 and $9,900 in 1953 (Table 37). These dollar earnings represent 12.6 per cent and 10.6 per cent, respectively, of the total capital investment in this unit.

Net cash income on the 160-2 model was $18,272 in 1955 and $15,649 in 1953.

Earnings on the 160-3 Cotton-Alfalfa-Potato Farm Compare Closely With Those for the 160-2 Units

Before allotments, the 160-3 farm had about two-thirds of its land in cotton, with the other third divided so that alfalfa used a few more acres than potatoes (Table 38). Operators on this unit also found it necessary to reduce potatoes slightly in 1955, and at the same time, they cut cotton acres almost in half. They almost doubled alfalfa and added 25 acres of field corn to use up the remaining land (Table 38). Cotton was responsible for three-fourths of the gross receipts on this model in 1953, and the cotton figure for receipts minus costs exceeded that of the total farm by almost $2,000. Alfalfa gross receipts barely equalled costs of inputs, not including land, and potatoes lacked $1,600 of grossing enough to cover such costs (Table 38). The price changes between 1953 and 1955 for alfalfa and potatoes helped these two crops earn an excess of receipts over costs in 1955. The returns from field corn, however, were less satisfactory and this crop shows a negative value for receipts minus costs (Table 38).

Total returns to capital and management were $12,000 in 1955 and $11,000 in 1953 for the 160-3 farm. When expressed as the rates earned on capital, the 12.7 per cent profit in 1955 exceeded that for the earlier year by about one per cent.

The 160-3 model returned net cash income of $18,470 over cash costs and expenses in 1955 and $17,140 in 1953.

Cotton was still by far the most profitable crop on this unit in 1955.

OPERATORS ON 320-ACRE FARMS BENEFITED FROM SCALE ADVANTAGES BUT ALLOTMENTS REDUCED THEIR PROFITS: PRICE AND YIELD GAINS LESSENED THEIR ADJUSTMENT PROBLEMS.

The 320-acre class interval includes the largest farm sizes in the Upper San Joaquin Valley that lend themselves to family operation with only part-time hired labor. Actually, operators of these farms often hire a man on a year-around basis, rather than depend on finding qualified workers during the summer months when needed. The relatively high degree of mechanization on these farms favors this practice in two ways. The operator is usually more successful in hiring and keeping workers that he can trust with expensive power and machinery units if he offers employment on a yearly basis, and he can use such people to service and overhaul machinery and equipment in the winter months when field work does not demand their time. Our analysis of the 320-acre farms assumes that the operator serves as one full time field worker, and that he hires a man for the summer months to meet additional regular labor requirements. Strictly seasonal work, such as hoeing and thinning cotton, is done by contract labor as on the smaller sizes of farms.

The 245 farms with cotton allotments in the 320-acre class interval during 1954 represented 13.1 per cent of all allotments in Kern County, and included 12.5 per cent of the crop land reported by all allotment-holders. The soils and water conditions on these farms are essentially the same as those previously outlined for the 80- and 160-acre farms. Our analysis models include three variations in the 320-acre class interval. The 320-1 cotton-barley farm is the one with water problems including short supplies, relatively high costs, and difficulties in penetration. Soils on this unit also are at the grade two and grade three levels. The other two models,

Table 39. Crops and Land Use on Typical 320 Acre Farms, 1953-1955; 320-1, Cotton-Barley 320-2, Cotton-Alfalfa-Potatoes, 320-3, Cotton-Potatoes, in Upper San Joaquin Valley

Year 1	Cotton 2	Alfalfa seed 3	Alfalfa 4	Potatoes 5	Field corn 6	Barley 7	Milo 8	Idle or fallow 9	Double crop 10	Total crop-land 11	Non culti-vated 12	Total land 13
320-1												
1953	216	--	--	--	--	50	--	34	--	300	20	320
1954	143	40	--	--	--	65	--	52	--	300	20	320
1955	119	60	--	--	--	70	--	51	--	300	20	320
Changes												
1953 to 1954	-73	+40	--	--	--	+15	--	+18	--	--	--	--
1954 to 1955	-24	+20	--	--	--	+ 5	--	- 1	--	--	--	--
1953 to 1955	-97	+60	--	--	--	+20	--	+17	--	--	--	--
320-2												
1953	216	--	60	24	--	--	--	--	--	300	20	320
1954	143	--	65	20	60	--	--	12	--	300	20	320
1955	119	--	70	22	55	--	--	34	--	300	20	320
Changes												
1953 to 1954	-73	--	+ 5	- 4	+60	--	--	+12	--	--	--	--
1954 to 1955	-24	--	+ 5	+ 2	- 5	--	--	+22	--	--	--	--
1953 to 1955	-97	--	+10	- 2	+55	--	--	+34	--	--	--	--
320-3												
1953	216	--	--	70	--	--	--	14	--	300	20	320
1954	143	--	--	50	--	103	50	4	50	300	20	320
1955	119	--	21	62	--	90	55	8	55	300	20	320
Changes												
1953 to 1954	-73	--	--	-20	--	+103	+50	-10	+50	--	--	--
1954 to 1955	-24	--	+21	+12	--	- 13	+ 5	+ 4	+ 5	--	--	--
1953 to 1955	-97	--	+21	- 8	--	+ 90	+55	- 6	+55	--	--	--

the 320-2 cotton-alfalfa-potato, and the 320-3 cotton-potato farms have mostly grade one and two soils and more satisfactory water conditions.

Operators on the 320-acre Farms Shifted to Lower Gross Receipts Crops and Fallowed Some Land After Cotton Allotments

Farmers on the 320-1 farms already were growing barley and fallowing some land prior to allotments. They increased acres in both these uses and added an alfalfa seed enterprise after allotments (Table 39). They chose alfalfa seed as the summer crop to plant on a portion of the acres diverted from cotton because it seemed the most desirable of available alternatives. Alfalfa seed uses less irrigation water than most other summer crops of comparable gross receipts, and also these operators could produce the crop largely with the equipment that they already owned and used in producing barley or cotton.

Operators on the 320-1 model summer fallow a portion of their crop land because they believe this procedure enables them to maximize total farm net returns or profits. The specific factors involved may relate to the short supply and high cost of irrigation water or to effectiveness in using machinery, labor or other resources. These operators, like those in similar soil and water situations on the 80- and 160-acre farms, find it difficult to select a profitable alternative to cotton.

The 320-2 model increased alfalfa hay by 17 per cent, added 55 acres of field corn, and fallowed 34 acres after allotments (Table 39). In addition to the cuts in cotton acres, operators on such units also found it necessary to reduce potato acreage slightly, further accentuating the problem of finding alternative crops for diverted acres.

Farmers on the 320-3 model also cut both cotton and potato acreage, but found themselves with more acres in new uses because potatoes are more

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Table 40. Physical Resources and Investment for Typical 320-Acre Farms (320-1, 320-2, 320-3) in Upper San Joaquin Valley
1955 Prices a/

Item and description	Size or capacity	Amount	New cost		Investment	
			per unit	total	per unit	total
1	2	3	4	5	6	7
Land:						
Total farm	320 acres					
Total cultivated	300 acres					
Improvements:						
Tenant houses	2 bedroom			$ 3000.00		$ 1500.00
Tractor shed		1		1500.00		750.00
Shop		1		2500.00		1250.00
Fuel storage-gas	550 gal.	1		135.00		67.50
Fuel storage-diesel	550 gal.	1		135.00		67.50
Subtotal				7270.00		3635.00
Irrigation facilities:						
Pumping plant (75 HP)	1200 gpm	3	5400.00	16200.00	2770.00	8310.00
Well, casing (180' lift)	14" diam.	3x500'	7.40	11100.00	3.70	5550.00
Subtotal				27300.00		13860.00
Distribution system:						
Reservoir	5.0 ac.ft.	1		100.00		50.00
Pipe	14 in.	10,560'	.90	9504.00	.45	4752.00
Stands	5'-36"	5	9.00	225.00	4.50	112.50
Vents	5'-6"	10	.75	37.50	.38	18.75
Alfalfa valves	10 in.	150	15.00	2250.00	7.50	1125.00
Siphons	1½ in.	200	1.27	254.00	.64	127.00
	2 in	200	1.44	288.00	.72	144.00
	3 in.	50	1.90	95.00	.95	47.50
Rowpipe	2 in.	500	1.50	750.00	.75	375.00
Subtotal				13503.50		6751.75
Power:						
Tracklayer	T-5D	1		7000.00		3850.00
Wheel	W-1	1		2600.00		1820.00
	W-2	2	3000.00	6000.00	2100.00	4200.00
Subtotal				15600.00		9870.00
Transportation:						
Pickup	3/4 ton	1		2300.00		1380.00
Truck	1½ ton	1		2800.00		1470.00
Subtotal				5100.00		2850.00
Equipment:						
Ditcher	5 ft.	1		140.00		70.00
Scraper	10 ft.	1		520.00		260.00
Plow, 2 way	2-16"	1		550.00		275.00

(Continued on next page.)

Table 40 continued

Item and description	Size or capacity	Amount	New cost		Investment	
			per unit	total	per unit	total
1	2	3	4	5	6	7
Equipment (continued):						
Chisel	8'	1		$ 525.00		$ 262.50
Disk, offset	7'	1		550.00		275.00
Disk, offset	10½'	1		900.00		450.00
Border disk		1		175.00		87.50
Spiketooth harrow	4' section	3	30.00	90.00	15.00	45.00
Cultipacker	12'	1		380.00		190.00
Lister	4 row	1		350.00		175.00
Lister planter	4 row	1		550.00		275.00
Cultivator	2 row	2	350.00	700.00	175.00	350.00
Cultivator	4 row	1		1000.00		500.00
Fertilizer attachment	4 row	1		100.00		50.00
Cotton picker	1 row	1		8700.00		5220.00
Cotton trailer	4 bale	2	350.00	700.00	192.50	385.00
Cotton trailer	6 bale	3	450.00	1350.00	247.33	742.00
Stalk cutter	2 row	1		325.00		167.50
Broadcaster		1		250.00		125.00
Additional equipment:						
320-1 only						
Springtooth harrow	12'	1		240.00		120.00
320-2 & 320-3 only						
Power mower	7'	1		350.00		175.00
Side delivery rake	8'	1		520.00		260.00
Potato planter	2 row	1		700.00		350.00
Steel roller	6'	1		200.00		100.00
Equipment 320-1				18095.00		10024.50
Equipment 320-2				19625.00		10789.50
Equipment 320-3				19625.00		10789.50
Total 320-1				$86868.50		$46991.25
Total 320-2				$88398.50		$47756.25
Total 320-3				$88398.50		$47756.25

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a/ The designations 320-1, 320-2, 320-3 refer to three variations found in the 320 acre size group.

important on these units than on the 320-2 farms. They added a sizeable barley enterprise, a part of which they double-cropped with milo, and planted a small acreage of alfalfa hay.

Fixed Costs Remained Relatively Stable After Cotton Allotments

The original outlays for improvements, power, and equipment on the 320-acre farms in this analysis amounted to $86,000 to $88,000 at 1955 prices (Table 40). The average investments, considering usual extent of depreciation of equipment on these farms, ranged from $47,000 to $48,000. Total fixed costs on the farm capital investment in improvements and equipment, therefore, represent a major cost item on the 320-acre models. The annual dollar amount of such costs varied from $12,000 to $13,000 during 1953 and 1955 on all three of the units that we analyzed (Tables 48-50).

Fixed costs per acre rose for such crops as cotton, potatoes, and alfalfa that already occupied an important fraction of the total crop land prior to allotments. Crops that operators expanded sharply, on the other hand, usually show some reduction in fixed or overhead costs per acre from 1953 to 1955 (Tables 48-50).

Operators on the 320-acre farms still had enough cotton acres after allotments to make effective use of their mechanical harvesters, and they, therefore, do not face the same problems in this respect as the farmers on the 160-acre farms. Farmers on the 320-2 units found it necessary to provide hay-cutting equipment when they added an alfalfa hay enterprise. Otherwise, by using custom harvesting and certain other services, the operators on the 320-acre farms were able to adjust their cropping systems after allotments with no important increases in investments or annual overhead costs.

Overhead costs per hour of tractor or equipment time followed about the same pattern of increases on the 320-acre farms as on the two smaller

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Table 41. Annual Irrigation Water Use by Crops, 1955 and 1953;
320-1, 320-2, 320-3 farms in
Upper San Joaquin Valley

Crops	1955				1953			
	Acres	Inches per acre	Total	Pumping hours required	Acres	Inches per acre	Total	Pumping hours required
1	2	3	4	5	6	7	8	9
320-1								
Cotton	119	42.0	4998.0	624.75	216	39.0	8424.0	1053.0
Alfalfa seed	60	30.0	1800.0	225.00	--			
Barley	70	14.4	1008.0	126.00	50	14.4	720.0	90.0
Total acre-inches			7806.0	975.75			9144.0	1143.0
Total acre-feet			609.6				762.0	
320-2								
Cotton	119	42.0	4998.0	624.75	216	39.0	8424.0	1053.0
Alfalfa	70	57.6	4032.0	504.00	60	57.6	3456.0	432.0
Potatoes	22	36.0	792.0	99.00	24	36.0	864.0	108.0
Field corn	55	42.0	2310.0	288.75	--			
Total acre-inches			12132.0	1516.50			12744.0	1593.0
Total acre-feet			1011.0				1062.0	
320-3								
Cotton	119	42.0	4998.0	624.75	216	39.0	8424.0	1053.0
Alfalfa	21	57.6	1209.6	151.20	--			
Potatoes	62	36.0	2232.0	279.00	70	36.0	2520.0	315.0
Barley	90	14.4	1296.0	162.00	--			
Milo	55	27.0	1485.0	185.63	--			
Total acre-inches			11220.6	1402.58			10944.0	1368.0
Total acre-feet			935.1				912.0	

Table 42. Costs for Irrigation Equipment, 1955 and 1953;
320-1, 320-2, and 320-3 Farms in
Upper San Joaquin Valley

A. Overhead (320-1, 320-2, 320-3)

Item	Original cost	Life expected	Average investment	Annual Non Cash Overhead Costs			Taxes and Insur.	Total overhead
				Depr.	Interest	Total		
Pumping plant	16200.00	20	8310.00 a/	789.00	415.50	1204.50	39.97	1244.47
Well & casing	11100.00	20	5555.00	555.00	277.50	832.50	26.70	859.20
Reservoir	100.00	--	50.00	--	2.50	2.50	.24	2.74
Pipe line	9766.50	30	4883.00	162.77	244.15	406.92	23.48	430.40
Valves-alfalfa	2250.00	30	1125.00	37.50	56.25	93.75	5.41	99.16
Siphons	637.00	5	329.00	127.40	16.45	143.85	1.58	145.43
Rowpipe	750.00	10	375.00	75.00	18.75	93.75	1.80	95.55
Total						2777.77		2876.95

B. Operating and total costs 320-1

	1955				1953			
	Operating costs			Total annual cost	Operating costs			Total annual cost
	Power & lube b/	Repairs	Total		Power & lube b/	Repairs	Total	
Pumping plant	4661.35	324.00	4985.35	6229.82	5063.04	324.00	5387.04	6631.51
Well & casing	--	--	--	859.20	--	--	--	859.20
Reservoir	--	5.00	5.00	7.74	--	5.00	5.00	7.74
Pipe line	--	48.83	48.83	479.23	--	48.83	48.83	479.23
Valves-alfalfa	--	11.25	11.25	110.41	--	11.25	11.25	110.41
Siphons	--	--	--	145.43	--	--	--	145.43
Rowpipe	--	--	--	95.55	--	--	--	95.55
Total			5050.43	7927.38			5452.12	8329.07
C. Operating and total costs 320-2								
Pumping plant	5960.07	324.00	6284.07	7528.54	6143.78	324.00	6467.78	7712.25
Well & casing	--	--	--	859.20	--	--	--	859.20
Reservoir	--	5.00	5.00	7.74	--	5.00	5.00	7.74
Pipe line	--	48.83	48.83	479.23	--	48.83	48.83	479.23
Valves-alfalfa	--	11.25	11.25	110.41	--	11.25	11.25	110.41
Siphons	--	--	--	145.43	--	--	--	145.43
Rowpipe	--	--	--	95.55	--	--	--	95.55
Total			6349.15	9226.10			6532.86	9409.81
D. Operating and total costs 320-3								
Pumping plant	5686.46	324.00	6010.46	7254.93	5603.41	324.00	5927.41	7171.88
Well & casing	--	--	--	859.20	--	--	--	859.20
Reservoir	--	5.00	5.00	7.74	--	5.00	5.00	7.74
Pipe line	--	48.83	48.83	479.23	--	48.83	48.83	479.23
Valves-alfalfa	--	11.25	11.25	110.41	--	11.25	11.25	110.41
Siphons	--	--	--	145.43	--	--	--	145.43
Rowpipe	--	--	--	95.55	--	--	--	95.55
Total			6075.54	8952.49			5992.49	8869.44

(Continued on next page.)

Table 42 continued.

E. Unit costs c/		1955			1953		
		overhead	operating	total	overhead	operating	total
320-1	Cost per acre-inch	.369	.647	1.016	.315	.596	.911
	Cost per acre-foot	4.719	8.285	13.004	3.776	7.154	10.930
320-2	Cost per acre-inch	.237	.523	.760	.226	.512	.738
	Cost per acre-foot	2.846	6.280	9.126	2.709	6.151	8.860
320-3	Cost per acre-inch	.256	.542	.798	.263	.547	.810
	Cost per acre-foot	3.077	6.497	9.574	3.154	6.571	9.725

a/ Salvage value of $420.00 considered.

b/ Power for pumping irrigation water includes demand charge, varying with motor horsepower, and current consumed at rates varying with amount used.

c/ Water produced per farm in acre-feet:

	1955	1953
320-1	609.6	762.0
320-2	1011.0	1062.0
320-3	935.1	912.0

Table 43. Annual Tractor Hours, 1955 and 1953; 320-1, 320-2, and 320-3 Farms in Upper San Joaquin Valley

Crop	T-5D		W-2		W-1	
	1955	1953	1955	1953	1955	1953
1	2	3	4	5	6	7
320-1						
Cotton	266.56	483.84	549.78	998.16	165.41	300.00
Alfalfa seed	37.20	xxx	157.20	xxx	xxx	xxx
Barley	44.80	32.00	15.40	11.00	30.80	22.00
Total hours	348.56	515.84	722.38	1009.16	196.21	322.00
320-2						
Cotton	266.56	483.84	549.78	998.16	165.41	300.00
Alfalfa	39.90	34.20	35.00	30.00	329.00	282.00
Potatoes	59.62	65.04	58.96	64.32	xxx	xxx
Corn	79.75	xxx	112.20	xxx	14.30	xxx
Total hours	445.83	583.08	755.94	1092.48	508.71	582.00
320-3						
Cotton	266.56	483.84	549.78	998.16	165.41	300.00
Alfalfa	11.97	xxx	10.50	xxx	98.70	xxx
Potatoes	168.02	189.70	166.16	187.60	xxx	xxx
Barley	57.60	xxx	19.80	xxx	39.60	xxx
Milo	72.60	xxx	70.40	xxx	xxx	xxx
Total hours	576.75	673.54	816.64	1185.76	303.71	300.00

Table 44. Overhead Costs for Tractors and Equipment, 1955 and 1953; 320-1, 320-2, 320-3, Farms in Upper San Joaquin Valley

Item	Original cost	Life expected	Salvage value	Average investment	Annual noncash overhead costs			Taxes and insurance	All overhead
					Depr.	Int.	Total		
1	2	3	4	5	6	7	8	9	10
T-5D tractor	7000	10	700	3850	630.00	192.50	822.50	12.82	835.32
W-1 tractor	2600	6	1040	1820	260.00	91.00	351.00	6.06	357.06
W-2 tractor (2)	6000	6	2400	4200	600.00	210.00	810.00	13.99	823.99
Pickup 3/4 ton	2300	5	460	1380	368.00	69.00	437.00	54.60	491.60
Truck 1 1/2 ton	2800	10	140		266.00	73.50	339.50	79.90	419.40
5' ditcher	140	10	0	70	14.00	3.50	17.50	.23	17.73
10' scraper	520	10	0	260	52.00	13.00	65.00	.87	65.87
2 way/2-16" plow	550	10	0	275	55.00	13.75	68.75	.92	69.67
8' chisel	525	10	0	262	52.50	13.10	65.60	.87	66.47
7' offset disk	550	10	0	275	55.00	13.75	68.75	.92	69.67
10 1/2' offset disk	900	10	0	450	90.00	22.50	112.50	1.50	114.00
Border disk	175	10	0	88	17.50	4.40	21.90	.29	22.19
12' spiketooth harrow	90	15	0	45	6.00	2.25	8.25	.15	8.40
12' springtooth harrow	240	15	0	120	16.00	6.00	22.00	.40	22.40
12' cultipacker	380	10	0	190	38.00	9.50	47.50	.63	48.13
4 row lister	350	10	0	175	35.00	8.75	43.75	.58	44.33
4 row lister planter	550	10	0	275	55.00	13.75	68.75	.92	69.67
2 row cultivator (2)	700	10	0	350	70.00	17.50	87.50	1.17	88.67
4 row cultivator	1000	10	0	500	100.00	25.00	125.00	1.66	126.66
4 row fertilizer attachment	150	10	0	75	15.00	3.75	18.75	.25	19.00
1 row cotton picker	8700	5	1740	5220	1392.00	261.00	1653.00	17.38	1670.38
4 bale cotton trailer (2)	700	5	70	385	126.00	19.25	145.25	1.28	146.53
6 bale cotton trailer (3)	1350	5	135	742	243.00	37.10	280.10	2.47	282.57
2 row stalk cutter	325	10	0	162	32.50	8.10	40.60	.54	41.14
7' power mower	350	10	0	175	35.00	8.75	43.75	.58	44.33
8' side delivery rake	520	10	0	260	52.00	13.00	65.00	.87	65.87
Broadcaster	250	10	0	125	25.00	6.25	31.25	.42	31.67
2 row potato planter	700	15	0	350	46.67	17.50	64.17	1.17	65.34
6' steel roller	200	15	0	100	13.33	5.00	18.33	.33	18.66
Total 320-1							5751.70		5952.52
Total 320-2							5920.95		6124.32
Total 320-3							5920.95		6124.32

Table 45. Operating and Total Annual Costs for Tractors and Equipment, 1955 and 1953; 320-1 Farms in Upper San Joaquin Valley

Item	1955					1953				
	Operating costs			Total annual cost	Cost per hour	Operating costs			Total annual cost	Cost per hour
	fuel and lube	repairs	total			fuel and lube	repairs	total		
1	2	3	4	5	6	7	8	9	10	11
T-5D tractor	174.28	225.00	399.28	1234.60	3.542	257.92	225.00	482.92	1318.92	2.556
W-2 tractor (2)	433.43	200.00	633.43	1457.42	2.018	605.50	200.00	805.50	1629.49	1.615
W-1 tractor	78.48	60.00	138.48	495.54	2.526	128.80	60.00	188.80	545.86	1.695
Pickup 3/4 ton	360.00	115.00	475.00	966.60	.080a/	360.00	115.00	475.00	966.60	.080a/
Truck 1 1/2 ton	200.00	84.00	284.00	703.40	.141a/	200.00	84.00	284.00	703.40	.141a/
5' ditcher	-	4.20	4.20	21.93	.709	-	4.20	4.20	21.93	.406
10' scraper	-	15.60	15.60	81.47	2.632	-	15.60	15.60	81.47	1.509
8' chisel	-	52.50	52.50	118.97	.822	-	52.50	52.50	118.97	.492
7' offset disk	-	82.50	82.50	152.17	2.712	-	82.50	82.50	152.17	2.536
10 1/2' offset disk	-	135.00	135.00	249.00	1.746	-	135.00	135.00	249.00	1.496
Border disk	-	17.50	17.50	39.69	2.577	-	17.50	17.50	39.69	3.608
12' spiketooth harrow	-	1.80	1.80	10.20	.088	-	1.80	1.80	10.20	.118
12' springtooth harrow	-	7.20	7.20	29.60	1.233					
12' cultipacker	-	38.00	38.00	86.13	3.620		38.00	38.00	86.13	1.994
4 row lister	-	52.50	52.50	96.83	2.803	-	52.50	52.50	96.83	1.793
4 row lister planter	-	55.00	55.00	124.67	2.907	-	55.00	55.00	124.67	1.862
4 row cultivator	-	200.00	200.00	326.66	1.082	-	200.00	200.00	326.66	.856
4 row fertilizer attachment	-	30.00	30.00	49.00	1.004	-	30.00	30.00	49.00	.553
1 row cotton picker	-	1455.00	1455.00	3125.38	9.447	-	1455.00	1455.00	3125.38	5.205
6 bale cotton trailer (3)	-	40.50	40.50	323.07	3.017	-	40.50	40.50	323.07	1.662
2 row stalk cutter	-	16.25	16.25	57.39	.965	-	16.25	16.25	57.39	.531
Broadcaster	-	12.50	12.50	44.17	2.868	-	12.50	12.50	44.17	4.015
Total 320-1			4146.24	9793.89				4445.07	10070.32	

a/ Cost per mile

Table 46. Operating and Total Annual Costs for Tractors and Equipment, 1955 and 1953; 320-2 Farms in Upper San Joaquin Valley

Item	1955					1953				
	Operating costs			Total annual cost	Cost per hour	Operating costs			Total annual cost	Cost per hour
	fuel and lube	repairs	total			fuel and lube	repairs	total		
1	2	3	4	5	6	7	8	9	10	11
T-5D tractor	222.92	225.00	447.92	1283.24	2.878	291.54	225.00	516.54	1351.86	2.318
W-2 tractor (2)	453.56	200.00	653.56	1477.55	1.955	655.49	330.00	985.49	1809.48	1.656
W-1 tractor	203.48	85.00	288.48	645.54	1.269	232.80	85.00	317.80	674.86	1.160
Pickup 3/4 ton	360.00	115.00	475.00	966.60	.080a/	360.00	115.00	475.00	966.60	.080a/
Truck 1 1/2 ton	200.00	84.00	284.00	703.40	.141a/	200.00	84.00	284.00	703.40	.141a/
5' ditcher	-	4.20	4.20	21.93	.511	-	4.20	4.20	21.93	.389
10' scraper	-	15.60	15.60	81.47	1.897	-	15.60	15.60	81.47	1.444
2 way/2-16" plow	-	66.75	66.75	136.42	2.362	-	66.75	66.75	136.42	7.579
8' chisel	-	52.50	52.50	118.97	.720	-	52.50	52.50	118.97	.437
10 1/2' offset disk	-	135.00	135.00	249.00	1.808	-	135.00	135.00	249.00	1.374
12' spiketooth harrow	-	1.80	1.80	10.20	.273	-	1.80	1.80	10.20	.183
12' cultipacker	-	38.00	38.00	86.13	3.619	-	38.00	38.00	86.13	1.994
4 row lister	-	52.50	52.50	96.83	2.198	-	52.50	52.50	96.83	1.793
4 row lister planter	-	55.00	55.00	124.67	2.311	-	55.00	55.00	124.67	1.862
2 row cultivator (2)	-	140.00	140.00	228.67	1.753	-	140.00	140.00	228.67	1.032
4 row cultivator	-	200.00	200.00	326.66	1.068	-	200.00	200.00	326.66	.856
4 row fertilizer attachment	-	30.00	30.00	49.00	.666	-	30.00	30.00	49.00	.553
1 row cotton picker	-	1455.00	1455.00	3125.38	9.447	-	1455.00	1455.00	3125.38	5.205
6 bale cotton trailer (3)	-	40.50	40.50	323.07	3.016	-	40.50	40.50	323.07	1.662
2 row stalk cutter	-	16.25	16.25	57.39	.964	-	16.25	16.25	57.39	.531
7' power mower	-	35.00	35.00	79.33	.522	-	35.00	35.00	79.33	.609
8' side delivery rake	-	52.00	52.00	117.87	.829	-	52.00	52.00	117.87	.968
Broadcaster	-	12.50	12.50	44.17	1.262	-	12.50	12.50	44.17	1.472
2 row potato planter	-	70.00	70.00	135.34	1.255	-	70.00	70.00	135.34	1.150
6' steel roller	-	10.00	10.00	28.66	4.342	-	10.00	10.00	28.66	3.981
Total 320-2			4631.56	10517.49				5061.43	10947.36	

a/ Cost per mile

Table 47. Operating and Total Annual Costs for Tractors and Equipment, 1955 and 1953;
320-3 Farms in Upper San Joaquin Valley

Item	1955					1953				
	Operating costs			Total annual cost	Cost per hour	Operating costs			Total annual cost	Cost per hour
	fuel and lube	repairs	total			fuel and lube	repairs	total		
1	2	3	4	5	6	7	8	9	10	11
T-5D tractor	288.38	225.00	513.38	1348.70	2.338	336.77	225.00	561.77	1397.09	2.074
W-2 tractor (2)	489.98	200.00	689.98	1513.97	1.854	711.46	330.00	1041.46	1865.45	1.573
W-1 tractor	121.48	60.00	181.48	538.54	1.773	120.00	60.00	180.00	537.06	1.790
Pickup 3/4 ton	360.00	115.00	475.00	966.60	.080a/	360.00	115.00	475.00	966.60	.080a/
Truck 1 1/2 ton	200.00	84.00	284.00	703.40	.141a/	200.00	84.00	284.00	703.40	.141a/
5' ditcher	-	4.20	4.20	21.93	.467	-	4.20	4.20	21.93	.360
10' scraper	-	15.60	15.60	81.47	1.735	-	15.60	15.60	81.47	1.336
2 way/2-16" plow	-	66.75	66.75	136.42	2.934	-	66.75	66.75	136.42	2.598
8' chisel	-	52.50	52.50	118.97	.708	-	52.50	52.50	118.97	.423
10 1/2' offset disk	-	135.00	135.00	249.00	.949	-	135.00	135.00	249.00	1.140
Border disk	-	17.50	17.50	39.69	2.004					
12' spiketooth harrow	-	1.80	1.80	10.20	.088	-	1.80	1.80	10.20	.178
12' cultipacker	-	38.00	38.00	86.13	2.080	-	38.00	38.00	86.13	1.994
4 row lister	-	52.50	52.50	96.83	2.226	-	52.50	52.50	96.83	1.793
4 row lister planter	-	55.00	55.00	124.67	2.335	-	55.00	55.00	124.67	1.862
2 row cultivator (2)	-	140.00	140.00	228.67	1.374	-	140.00	140.00	228.67	.869
4 row cultivator	-	200.00	200.00	326.66	1.303	-	200.00	200.00	326.66	.856
4 row fertilizer attachment	-	30.00	30.00	49.00	1.004	-	30.00	30.00	49.00	.553
1 row cotton picker	-	1455.00	1455.00	3125.38	9.447	-	1455.00	1455.00	3125.38	5.205
6 bale cotton trailer (3)	-	40.50	40.50	323.07	3.016	-	40.50	40.50	323.07	1.662
2 row stalk cutter	-	16.25	16.25	57.39	.964	-	16.25	16.25	57.39	.531
7' power mower	-	35.00	35.00	79.33	1.741					
8' side delivery rake	-	52.00	52.00	117.87	2.765					
Broadcaster	-	12.50	12.50	44.17	1.458					
2 row potato planter	-	70.00	70.00	135.34	1.705	-	70.00	70.00	135.34	1.510
6' steel roller	-	10.00	10.00	28.66	1.541	-	10.00	10.00	28.66	1.365
Total 320-3			4643.94	10552.06				4925.33	10669.39	

a/ Cost per mile

Table 48. Input Costs by Crops and Total Farm, 1955 and 1953, 320-1 Farm in Upper San Joaquin Valley

	1955						
Item	Cotton 119 acres		Alfalfa seed 60 acres		Barley 70 acres		All crops total 266 acres
	per acre	total	per acre	total	per acre	total	
1	2	3	4	5	6	7	8
Overhead	68.14	8,338.20	41.12	2,654.82	26.14	2,024.04	13,017.06
Operating:							
Power	11.52	1,370.88	4.43	265.80	3.64	254.80	1,891.48
Equipment	16.39	1,950.77	1.69	101.40	1.05	73.50	2,125.67
Materials	38.04	4,526.76	19.41	1,164.60	12.52	876.40	6,567.76
Labor	22.85	2,719.48	11.15	669.08	6.38	446.58	3,835.14
Contracts	62.24	7,406.46	80.84	4,850.64	12.73	890.68	13,147.78
Total operating	151.04	17,974.35	117.52	7,051.52	36.32	2,541.96	27,567.83
Total cost	219.18	26,312.55	158.64	9,706.34	62.46	4,566.00	40,584.89
	1953						
	216 acres		--		50 acres		249 acres
Overhead	48.99	10,807.38			29.60	1,530.00	12,337.38
Operating:							
Power	9.91	2,140.56			3.08	154.00	2,294.56
Equipment	9.58	2,070.14			1.14	57.00	2,127.14
Materials	32.51	7,022.16			11.78	589.00	7,611.16
Labor	22.26	4,808.23			6.13	306.29	5,114.52
Contracts	55.49	11,986.89			11.73	586.70	12,573.59
Total operating	129.75	28,027.98			33.86	1,692.99	29,720.97
Total cost	178.74	38,835.36			63.46	3,222.99	42,058.35

Table 49. Input Costs by Crops and Total Farm, 1955 and 1953, 320-2 Farm in Upper San Joaquin Valley

Item	Cotton 119 acres		Alfalfa 70 acres		Potatoes 22 acres		Field corn 55 acres		All crops total 266 acres
	per acre	total	per acre	total	per acre	total	per acre	total	
1	2	3	4	5	6	7	8	9	10
				1955					
Overhead	50.27	6,123.15	45.54	3,296.15	48.37	1,163.35	35.35	2,046.40	12,629.05
Operating:									
Power	10.95	1,303.05	4.67	326.90	7.33	161.26	5.66	311.30	2,102.51
Equipment	16.07	1,912.33	1.24	86.80	6.89	151.58	3.19	175.45	2,326.16
Materials	32.84	3,907.96	30.12	2,108.40	149.63	3,291.86	39.77	2,187.35	11,495.57
Labor	17.66	2,101.30	12.79	895.38	12.70	279.40	10.75	591.25	3,867.33
Contracts	69.34	8,252.05	36.75	2,572.50	267.50	5,884.89	23.27	1,279.60	17,989.04
Total operating	146.86	17,476.69	85.57	5,989.98	444.05	9,768.99	82.64	4,544.95	37,780.61
Total cost	197.13	23,599.84	131.11	9,286.13	492.42	10,932.34	117.99	6,591.35	50,409.66
				1953					
	216 acres		60 acres		24 acres		--		300 acres
Overhead	43.36	9,411.32	44.35	2,706.56	45.34	1,127.16			13,245.04
Operating:									
Power	10.16	2,194.56	4.15	249.00	6.68	160.32			2,603.88
Equipment	9.53	2,058.48	1.45	87.00	7.74	185.76			2,331.24
Materials	29.24	6,315.84	29.49	1,769.40	149.23	3,581.52			11,666.76
Labor	16.85	3,640.45	12.51	750.33	12.41	297.84			4,688.62
Contracts	63.26	13,663.21	36.75	2,205.00	267.49	6,419.75			22,287.96
Total operating	129.04	27,872.54	84.35	5,060.73	443.55	10,645.19			43,578.46
Total cost	172.40	37,283.86	128.70	7,767.29	488.89	11,772.35			56,823.50

Table 50. Input Costs by Crops and Total Farm, 1955 and 1953, 320-3 Farm in Upper San Joaquin Valley

Item	1955										
	Cotton 119 acres		Alfalfa 21 acres		Potatoes 62 acres		Barley 90 acres		Milo 55 acres		All crops total 292 acres
	per acre	total	per acre	total	per acre	total	per acre	total	per acre	total	
1	2	3	4	5	6	7	8	9	10	11	12
Overhead	57.19	6,862.90	47.51	1,046.11	36.44	2,307.74	20.12	1,578.38	24.89	1,393.18	13,188.31
Operating:											
Power	9.90	1,178.10	4.33	90.93	6.49	402.38	2.85	256.50	4.07	223.85	2,151.76
Equipment	15.94	1,897.22	4.15	87.15	3.96	245.71	.62	55.80	1.76	96.80	2,382.68
Materials	33.63	4,001.97	31.22	655.62	150.31	9,319.22	11.00	990.00	15.43	848.65	15,815.46
Labor	17.25	2,052.20	12.48	262.17	12.39	768.13	4.27	384.69	7.44	409.08	3,876.27
Contracts	66.73	7,940.90	36.75	771.75	267.42	16,579.87	12.62	1,135.08	15.33	843.60	27,271.20
Total operating	143.45	17,070.39	88.93	1,867.62	440.57	27,315.31	31.36	2,822.07	44.03	2,421.98	51,497.37
Total cost	200.64	23,933.29	136.44	2,913.73	477.01	29,623.05	51.48	4,400.45	68.92	3,815.16	64,685.68
	1953										
	216 acres		--		70 acres		--		--		286 acres
Overhead	44.19	9,676.18			34.44	2,541.90					12,218.08
Operating:											
Power	10.01	2,162.16			6.54	457.80					2,619.96
Equipment	9.43	2,036.88			3.46	242.20					2,279.08
Materials	30.60	6,609.60			150.49	10,534.30					17,143.90
Labor	16.93	3,656.45			12.45	871.69					4,528.14
Contracts	59.30	12,807.92			267.41	18,718.74					31,526.66
Total operating	126.27	27,273.01			440.35	30,824.73					58,097.74
Total cost	170.46	36,949.19			474.79	33,366.63					70,315.82

sizes. The operators used their equipment fewer hours per year, and therefore the costs per unit rose (Tables 43-47). Cost per acre foot of irrigation water rose on the 320-3 farm, but remained relatively steady on the remaining two models (Tables 41, 42).

We computed an estimated investment and overhead cost for land in the same manner for the 320's that we used on the smaller farms. The total investment amounts to $128,000, bare land basis, for the 320-2 and 320-3 models and $76,800 for the 320-1 unit. The same comments relative to the method of making this calculation and its meaning for the smaller farms also applies here. We recognize that these values are but estimates and that they likely are low as compared with what a prospective purchaser would have to pay if he undertook to buy this land.

Operators on the 320-acre Units Cushioned Cotton Acreage Cuts With Higher Yields and Prices for Cotton, Higher Prices for Potatoes and Alfalfa Hay.

Farmers on the 320-acre units in the Upper San Joaquin Valley used the same methods as those on the smaller farms in their attempts to adjust to the cotton acreage allotments. They used more water and fertilizer on cotton, and did a more effective job in selecting land and in timing the various cultural operations on this crop (Table 41). The result was a sharp rise in cotton yields on all three models (Tables 51-53). Operators on the 320's also benefited from the price rise on cotton between 1953 and 1955. The combined result of these factors was to lessen considerably the impact of the reduced cotton acres on the gross and net receipts from cotton.

Alfalfa hay was profitable on the 320-acre farms in both 1953 and 1955, while potatoes returned a net profit in 1955. Both these crops performed better as profit-earners in 1955 than during 1953 due to price rises between the two years (Tables 51-53). Barley returned a receipts minus costs margin

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

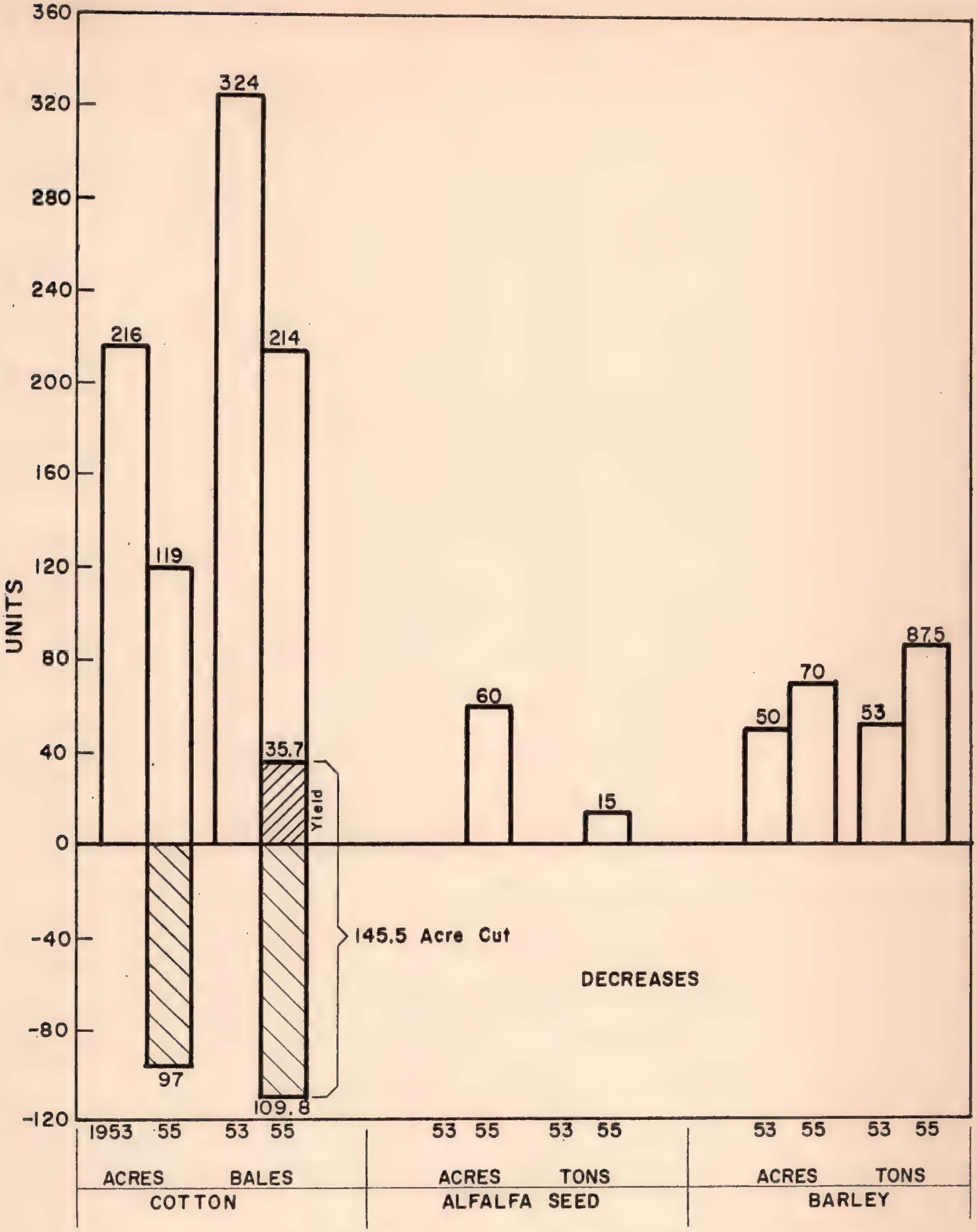
to pay for land and management on the 320-3 model in 1955, as did field corn on the 320-2 unit. Otherwise alfalfa seed, barley, and milo failed to cover costs, not including land, and therefore, contributed nothing to pay for the use of the land or the management. These crops did, however, assist in covering overhead costs.

Operators on 320-1 Farms Experienced Sharp Drops in Earnings From 1953 to 1955; Barley was the Best Use for Diverted Acres, but Served Only to Absorb Part of the Fixed Costs.

Farmers operating the 320-acre units in the Upper San Joaquin Valley had a 97 acre reduction in cotton acres under the 1955 allotment program. In spite of this cut, cotton provided all the excess of gross receipts over costs, not including land, both before and after allotments on the 320-1 farms. The operators on these units succeeded in increasing yields per acre enough to produce about 36 bales more cotton in 1955 than they would have produced on their allotted acres at 1953 yields. They, thus, offset about one-fourth of the effects of the acreage cut in terms of physical production of cotton. These growers also increased barley acres and yields and added 60 acres of alfalfa seed in an effort to maintain earnings in the face of the cotton allotments. The result was to increase the total farm production of these two crops by 35 tons and 15 tons, respectively (Figure X).

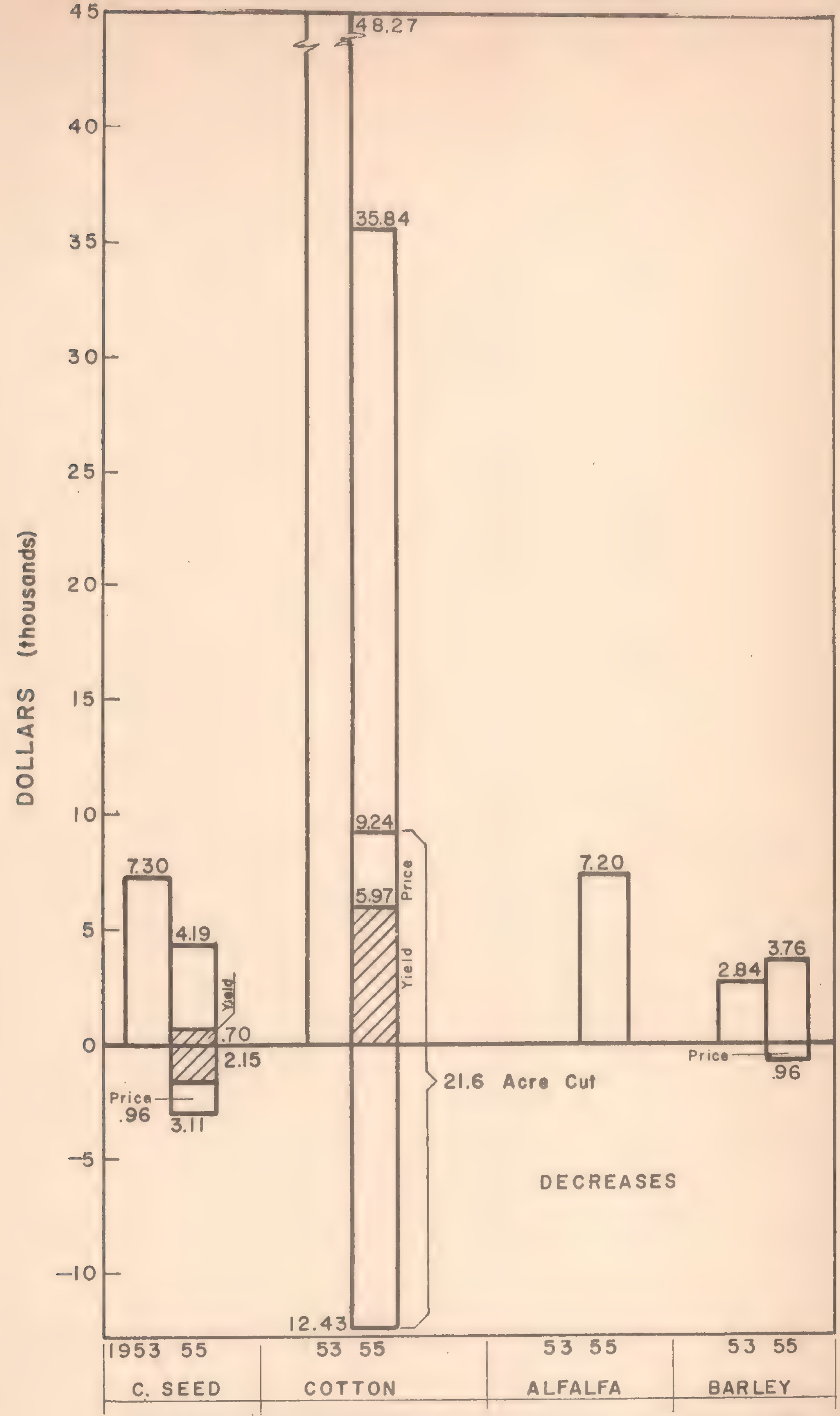
The higher cotton yields and a price increase between 1953 offset a considerable portion of the gross receipts impact of the total acreage cuts between 1953 and 1955. The 1955 total, gross receipts for cotton with the acreage cut, and at 1953 yield and price conditions would have been $26,670, a drop of $21,600 from 1953. The actual total in 1955, at $35,840, was $9,240 higher, with almost $6,000 of the operator's advantage due to his success in getting higher yields and the rest of it due to a price rise (Figure XI).

Figure X. Changes in Acres and Production; Cotton and Other Crops on 320–1 Farms in Upper San Joaquin Valley, 1953–1955



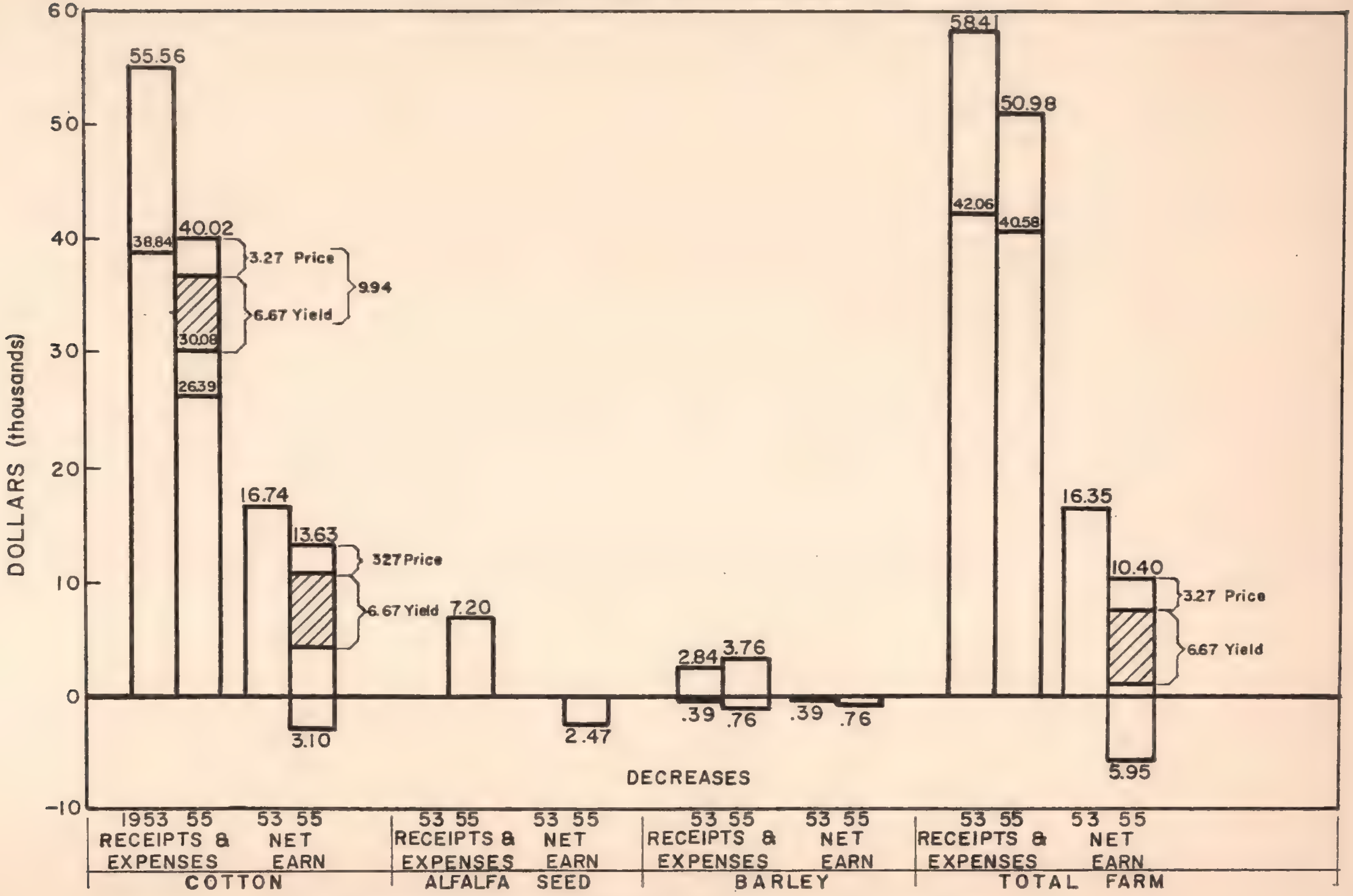
Operators on the 320-acre farms with soil and water problems planted most of their divert-acres to alfalfa seed and barley but fallowed an additional 17 acres.

Figure XI. Changes in Gross Receipts; Cotton and Other Crops on 320–1 Farms in Upper San Joaquin Valley, 1953–1955 (in thousands dollars)



Cotton yield and price increases offset about 43 per cent of the impact of cotton allotments on gross receipts for operators on the 320-acre farms.

Figure XII. Changes in Gross Receipts, Expenses, and Net Returns on 320–1 Farms in Upper San Joaquin Valley, 1953–1955 (in thousands dollars)



Cotton yield and price increases accounted for most of the net returns for both cotton and the farm total on the 320-acre farms with soil and water problems.

Table 51. Gross Receipts, Costs and Earnings by Crops and Total Farm, 1955 and 1953, 320-1 Farm in Upper San Joaquin Valley

Item 1	Cotton seed 2	Cotton lint 3	Alfalfa seed 4	Barley 5	Total farm 6
1955					
Acres		119	60	70	
Yield		1.8 bale	550 lbs.	25 cwt	
Production	91.0 tons	214.2 bale	30,000 lbs.	1,750 cwt	
Price (dollars)	$ 46.00	167.30	.24	2.15	
	4,186.00	35,835.66			
Gross Receipts		$40,021.66	7,200.00	3,762.50	$50,984.16
Costs (Less interest on land)		26,312.55	9,706.34	4,566.00	40,584.89
Receipts minus costs		13,709.11	(2,506.34)	(803.50)	10,399.27
Land interest ($240 per acre at 5%)		1,854.00	933.00	1,053.00	3,840.00
Net		11,855.11	(3,439.34)	(1,856.50)	6,559.27
Add:					
Interest on Fixed Capital (Includes Land)					6,140.55
Operator's Labor					1,835.23
Net Farm Income					14,535.05
Less:					
Operator's Labor					2,500.00
Return to Capital and Management a/					12,035.05
Rate Earned on Investment a/					9.72%
1953					
Acres		216	--	50	
Yield		1.5 bale		21 cwt	
Production	137.7 tons	324 bale		1,050 cwt	
Price (dollars)	53.00	148.99		2.70	
	$7,298.10	48,272.76			
Gross Receipts		$55,570.86		2,835.00	58,405.86
Costs (Less interest on land)		38,835.36		3,222.99	42,058.35
Receipts minus costs		16,735.50		(387.99)	16,347.51
Land interest ($240 per acre at 5%)		2,916.00		924.00	3,840.00
Net		13,819.50		(1,311.99)	12,507.51
Add:					
Interest in Fixed Capital (Includes Land)					6,134.55
Operator's Labor					2,500.00
Net Farm Income					21,357.24
Less:					
Operator's Labor					2,500.00
Return to Capital and Management a/					18,642.06
Rate Earned on Investment a/					15.06%

a/ See Table 21 for method of calculation.

Both barley and alfalfa seed added to the total farm gross receipts in 1955, but not as much as they would have done if the prices for both products had not dropped between 1953 and the later year. Without the drop in barley prices, this crop would have shown some excess of receipts over costs to apply against the cost of land and managerial services in 1955.

A comparison of the various crops on the 320-1 farm according to gross receipts, total costs excluding interest on land, and receipts minus costs leaves no doubt of the importance of cotton to this model. Net receipts minus costs for cotton were $16,730 and $13,630, respectively, in 1953 and 1955. The same values for the farm business as a whole, with the returns of other crops considered, were $16,350 in 1953 and $10,390 in 1955 (Figure XII). The net returns from cotton, thus, had to absorb net deficits from barley and alfalfa seed.

Operators on the 320-1 units have less favorable soils and water conditions than those on the other two models. Costs are higher and yields likely to be lower on most of the summer crops. These growers, therefore, find it most difficult to select substitutes for cotton that will return a profit. The best that they were able to do under 1955 conditions was to select crops that offered a good chance of covering all variable expenses plus some excess of gross receipts to apply against fixed overhead costs.

Higher yields and prices for cotton in 1955 than in 1953 were important in enabling farmers on the 320-1 model to avoid even more severe cuts in net returns in 1955. The $9,940 added gross receipts due to these two factors in 1955 lack $3,700 of equalling the total excess of gross receipts from cotton over costs, not including interest on land, and less than $500 of equalling the comparable figure for the entire farm business (Figure XII).

The net result of all the various acreage, yield, price, and cost factors affecting earnings of operators on the 320-1 farms was a drop of [illegible] was not damaged between [illegible] and the later year, although the crop in early

[illegible]

ment against the cost of land and non-capital [illegible] in [illegible].

A comparison of the various crops on the [illegible] farm [illegible]

[illegible]

[illegible] of [illegible] of cotton to [illegible]

[illegible] cost per bale [illegible], respectively, in 1953 and

1955. [illegible] for the farm as a whole, [illegible]

[illegible], were [illegible] 1953 and [illegible] in 1955 [illegible]

[illegible]

[illegible] on the [illegible] have less favorable [illegible] non-

[illegible] than those on the [illegible], these [illegible] and yields

[illegible]

[illegible] that they were [illegible] conditions was to

[illegible]

Although the [illegible] for cotton in 1955 than in 1953 [illegible]

[illegible] the 320-[illegible]

[illegible] 1955, the [illegible] received due to these two [illegible]

in [illegible] of [illegible] the total [illegible] of [illegible] from

[illegible] costs, [illegible] interest on land, [illegible] of

[illegible] the [illegible] figure for the entire farm business (Figure [illegible]).

The [illegible] of all the various [illegible], yields, prices, and cost

factors affecting earnings of operators on the 320-[illegible] farm [illegible] about $6,000 in profits or returns to capital and management between 1953 and 1955 (Table 51 and Figure XII). Dollar returns amounted to $18,642 in 1953 and $12,035 in 1955, a drop of about one-third between the two years. The comparable rates of earnings on total farm investments were 15.1 per cent and 9.7 per cent, respectively (Table 51).

Net cash income available to the operator to cover his obligations amounted to $20,150 in 1955 and $25,420 in 1953.

Higher Potato and Alfalfa Prices Helped Farmers on 320-2 Units to Minimize 1955 Drop in Profits.

Operators on the 320-2 farms have more favorable soil and water conditions than those on the 320-1 units. Cotton yields are higher on these models and other summer crops such as potatoes and alfalfa can be produced profitably. It is easier, therefore, for the farmers to adjust to the acreage allotment program and to find alternative crops that will return a net income above production costs even though these substitute crops may not be as profitable as cotton.

Our analysis indicates that among the crops other than cotton only potatoes failed to show a positive value for receipts minus costs, and this negative return was only in 1953. Prices rose from their abnormally low 1953 level and potatoes were profitable in 1955 (Table 52).

Growers on the 320-2 unit already were growing alfalfa and potatoes prior to the allotment programs. They expanded their alfalfa acreages, but cut potatoes slightly, along with other growers in the Upper San Joaquin Valley, after allotments came into the picture. In addition, these operators added a field corn enterprise to use some of the diverted acres. The latter crop had a positive value for receipts minus costs in 1955, but the amount of the return was not enough to cover the interest on land, and, thus,

paid nothing for management. Corn is not a low cost crop, and operators growing it must obtain relatively high yields if corn is to show a profit. The 50 hundredweight yield used in this analysis is equivalent to about a 90 bushel yield. Most Cornbelt growers would not be ashamed of such production--the Iowa average for 1953 was 61 bushels!

The analysis shows dollar returns of $38,578 or a rate earned on investment of 22 per cent in 1953, and $33,659 or 19 per cent on investments in 1955. Alfalfa hay and potatoes earned a net excess over all production costs, including interest on land in 1955, and thus added to profits from the total farm business. Operators on these farms did not find the alternative crops equally profitable in 1953, however, due to low prices. Net cash income amounted to $40,950 in 1955 and to $46,200 in 1953.

Operators on the 320-3 Farms Had Higher Earnings in 1955 Than in 1953, Due Primarily to Higher Potato Prices

Potatoes are an important secondary crop on the 320-3 model. The price gains for this crop made about $8,000 difference between 1953 and 1955 in receipts minus costs, and this was enough to more than offset the drop in the comparable value for cotton (Table 53). The result was an increase in profits for the total farm business from $25,664 in 1953 to $29,954 in 1955. The change in rate earned on investment was from 14.6 per cent to 17 per cent (Table 53).

Net cash income to operators on these units was $37,740 in 1955 and $32,290 in 1953.

Table 52. Gross Receipts, Costs and Earnings by Crops and Total Farm, 1955 and 1953, 320-2 Farm in Upper San Joaquin Valley

Item	Cotton seed	Cotton lint	Alfalfa	Potatoes	Field corn	Total farm
1	2	3	4	5	6	7
		1955				
Acres		119	70	22	55	
Yield		2.25 bale	7.0 ton	290 cwt	50 cwt	
Production	113.79 ton	267.75 bale	490 ton	6380 cwt	2750 cwt	
Price (dollars)	46.00	167.30	26.00	1.85	2.70	
	5,234.34	44,794.58				
Gross receipts		50,028.92	12,740.00	11,803.00	7,425.00	81,996.92
Costs (less interest on land)		23,599.84	9,286.13	10,932.34	6,591.35	50,409.66
Receipts minus costs		26,429.08	3,453.87	870.66	833.65	31,587.26
Land interest ($400 per acre at 5%)		2,920.00	1,580.00	620.00	1,280.00	6,400.00
Net		23,509.08	1,873.87	250.66	(446.35)	25,187.26
Add:						
Interest on fixed capital (includes land)						8,751.90
Operator's labor						2,217.21
Net farm income						36,156.37
Less:						
Operator's labor						2,500.00
Return to capital and management a/						33,656.37
Rate earned on investment a/						19.15%
		1953				
Acres		216	60	24		
Yield		2.0 bale	7.0 ton	290 cwt		
Production	183.6 ton	432 bale	420 ton	6960 cwt		
Price (dollars)	53.00	148.99	21.60	1.42		
	9,730.80	64,363.68				
Gross receipts		74,094.48	9,072.00	9,883.20		93,049.68
Costs (less interest on land)		37,283.86	7,767.29	11,772.35		56,823.50
Receipts minus costs		36,810.62	1,304.71	(1,889.15)		36,226.18
Land interest ($400 per acre at 5%)		4,520.00	1,300.00	580.00		6,400.00
Net		32,290.62	4.71	(2,469.15)		29,826.18
Add:						
Interest on fixed capital (includes land)						8,751.90
Operator's labor						2,500.00
Net farm income						41,078.08
Less:						
Operator's labor						2,500.00
Return to capital and management a/						38,578.08
Rate earned on investment a/						21.95%

a/ See Table 21 for method of calculation.

Table 53. Gross Receipts, Costs and Earnings by Crops and Total Farm, 1955 and 1953, 320-3 Farm in Upper San Joaquin Valley

			1955				
Item	Cotton seed	Cotton lint	Alfalfa	Potatoes	Barley	Milo	Total farm
1	2	3	4	5	6	7	8
Acres		119	21	62	90	55	
Yield		2.1 bale	7.0 ton	290 cwt	25 cwt	30 cwt	
Production	106.2 ton	249.9 bale	147 ton	17,980 cwt	2250 cwt	1650 cwt	
Price (dollars)	46.00	167.30	26.00	1.85	2.30	2.15	
	4,885.20	41,808.27					
Gross receipts		$46,693.47	3,822.00	33,263.00	5,175.00	3,547.50	92,500.97
Costs (less int. on land)		23,933.29	2,913.73	29,623.05	4,400.45	3,815.16	64,685.68
Receipts minus costs		22,760.18	908.27	3,639.95	774.55	(267.66)	27,815.29
Land interest ($400 per acre at 5%)		2,660.00	513.33	1,333.33	1,296.67	596.67	6,400.00
Net		20,100.18	394.94	2,306.62	(522.12)	(864.33)	21,415.29
		Add:					
		Interest on fixed capital (includes land)					8,756.30
		Operator's labor					2,282.44
		Net farm income					32,454.03
		Less:					
		Operator's labor					2,500.00
		Return to capital and management a/					29,954.03
		Rate earned on investment a/					17.04%
			1953				
Acres		216	--	70	--	--	
Yield		1.75 bale		290 cwt			
Production	160.6 bale	378 bale		20,300 cwt			
Price (dollars)	53.00	148.99		1.42			
	8,511.80	56,318.22					
Gross receipts		$64,830.02		28,826.00			93,656.02
Costs (less int. on land)		36,949.19		33,366.63			70,315.82
Receipts minus costs		27,880.83		(4,540.63)			23,340.20
Land interest ($400 per acre at 5%)		4,660.00		1,740.00			6,400.00
Net		23,220.83		(6,280.63)			16,940.20
		Add:					
		Interest on fixed capital (includes land)					8,723.90
		Operator's labor					2,500.00
		Net farm income					28,571.28
		Less:					
		Operator's labor					2,500.00
		Return to capital and management a/					25,664.10
		Rate earned on investment a/					14.60%

a/ See Table 21 for method of calculation.

SUMMARY AND CONCLUSIONS

The physical and economic context in the Upper San Joaquin Valley favors profitable farming under intensive conditions if prices are favorable. Soils, on the whole are highly productive, though water penetration problems exist. The climate features a long growing season, mild winters and relatively high summer temperatures. The most serious problem in the natural resource area concerns water. The amount and timing of precipitation makes irrigation essential for profitable crop production. Water is relatively expensive, and the imbalance between annual use and annual inflow of supply aggravates the cost problems.

Individual farmers find that fixed costs are high in the Upper San Joaquin Valley. Current land values and rents or other annual land costs reflect the relatively high post-war earnings, while costs on irrigation facilities, field power and equipment, and improvements likewise are at a high level. Operators in the area have large amounts of capital invested in their business, whether they are tenants or land-owners. The tendency since World War II has been to increase the size of farm power and machinery units and to use machines to perform tasks formerly executed by human hands. A problem closely related to the increased investments accompanying this trend is an increase in indebtedness. Many growers find themselves obligated to pay considerable amounts annually to service their debts on farm capital goods. From the individual's viewpoint, such obligations represent fixed costs, and unlike depreciation or interest on investment in farm capital, these costs cannot be deferred.

Farmers in the Upper San Joaquin Valley plant most of their irrigated land in field crops, and cotton had come to occupy over two-thirds of the total crop acres in recent years prior to the 1954 cotton acreage allotments.

[illegible]

The physical and economic [illegible] in the [illegible] Valley [illegible] [illegible], [illegible] on the whole are fairly productive, though water [illegible] exist; The climate [illegible] a long growing season, with winters and relatively high [illegible] temperatures. [illegible]

[illegible] reflect the relatively high post-war earnings; while costs of irrigation [illegible] War II has been to increase the use of farm power and machinery [illegible] to use machines to [illegible] by [illegible]. A [illegible]

[illegible]

Potatoes were the second most important on irrigated land, though not as widely adapted in terms of soils as cotton. Feed crops, primarily alfalfa hay but with some acreage of milo and barley, also appeared in the farm organization. In addition, a few growers produced grapes, and each year various farmers grew such specialty crops as alfalfa seed, onions, and lettuce. Cotton was the most important crop on farms of all sizes, but tended to occupy a larger percentage of the cropland on the smaller farms, and to decrease slightly in its relative importance as the total acres of cropland in the farm increased.

The fact that cotton dominated Upper San Joaquin Valley agriculture prior to allotments is the direct result of its greater profit capacity under the existing conditions. Farmers obtained excellent yields and the price stability at a relatively high level accompanying the Government support programs, enabled cotton to show greater consistent annual profits than alternative field crops with comparable breadth of market. Potatoes are able to compete profit-wise if prices are favorable, but year-to-year price variations make this crop a less consistent profit earner than cotton, and it does not have as wide a range of soil adaptation. None of the feed crops proved able to compete with cotton in terms of the prevailing prices and yields, while the limited market for specialty crops allowed them to occupy only a fraction of the land that cotton could use, profitably.

The national cotton marketing quotas and acreage allotments in 1954 required Upper San Joaquin Valley cotton growers, as a condition for continued price support at near existing levels, to cut their acres planted to cotton. By 1955, this reduction amounted to about 45 per cent of 1953 cotton acreage for the area as a whole. The acreage allotment program provides for enforcing strict compliance with cotton allotments, but, up to the time this is written,

no limitations or regulations on the growers choice of other crops or uses for the acres diverted from cotton. The Soil Bank Plan, inaugurated in 1956, does offer some inducements to farmers to put portions of their crop land into uses that will not result in marketable products.

As indicated, the Government continued cotton price support at relatively high levels in 1954 and 1955, under the cotton acreage allotment programs. The support level for barley and milo, however, declined in 1955. This left these grains vulnerable to the price-depressing influence of sharp increases in production. Another problem for these feed grains and corn is limited storage space in local areas, particularly those where growers did expand production considerably. The producer cannot take advantage of the price-support plan based on stored grain if he cannot find storage space. Alfalfa seed producers found themselves in a more acute phase of the same situation as grain growers because of a greater proportionate increase in production. Potato growers did not have a price support program, but do have their own price problems. The year 1953 was one of disastrously low selling prices for this crop, and potato producers reduced acres in 1954 and 1955 as compared with 1953. Alfalfa hay prices suffered sharp declines in 1954, but made strong recovery in 1955.

The Government undertook, under the cotton acreage allotment programs, to limit cotton production by regulating use of land; thus, the program focuses on land as the critical farm resource most readily controlled. These cotton programs furthermore, concerned themselves with but one commodity; cotton being the only crop for which acreage restrictions apply. Other programs do regulate the acres in wheat, rice, and, in certain areas, corn. No attempt was made under the 1954 or 1955 cotton acreage allotment programs to limit or direct how farmers use the land that they divert from cotton, or the resources other than land that they employ in producing cotton.

Farmers in the Upper San Joaquin Valley complied fully with the provisions of the cotton acreage allotment programs in 1954 and 1955. They reduced cotton acres in Kern County slightly more than the amount necessary under the overall allotments. They also attempted in every possible way to maintain their farm incomes in spite of the cut in cotton acres. First, they used both land and other resources more effectively to increase cotton yields and production, and thus compensate for their reduced number of acres. Second, they planted the acres diverted from cotton into alternative crops that promised to help them maintain farm profits.

We undertook in this study to determine what changes farmers made in resource use, what related changes occurred in factors such as prices, and what earnings effects accompanied the cotton acreage allotments in 1954 and 1955 on individual farms in the Upper San Joaquin Valley. To do this, we analyzed in detail the physical and economic impact of the changes between 1953 and 1955 in farm organization and production methods on 9 models representing typical farms. Three of these farm models were in each of the three important family farm sizes, those of 80, 160, and 320 total farm acres with practically all land tillable and irrigated. One model in each size group represents farms with soil and water problems. We obtained our primary data by questionnaire and interviews, and used all relevant secondary data available from various agricultural agencies.

Growers capitalized on the opportunity that the 45 per cent cut in cotton acres from 1953 to 1955 afforded them to use land itself more effectively. They selected the fields for cotton in 1955 that they considered to offer the best profit-earning possibilities in that crop for that year. So far as they could, and be consistant with the previous point, they also arranged so that cotton would not follow cotton on the same fields in two

successive years. Finally, they utilized the opportunity that the reduced acres in cotton offered to perform all cotton cultural operations on an optimum time schedule. All growers cooperating in interviews cited these three adjustments as important factors in the sharply increased cotton yields for 1954 and 1955. Upper San Joaquin Valley cotton growers, therefore changed the amount, the quality and the rate of use for their land, the latter both as between and within seasons.

Cotton producers also made important shifts in their use of resources other than land. They increased the inputs of fertilizer and irrigation water per acre in producing cotton, and, of course, the inputs of labor, power, machinery, and processing services that are roughly proportional to the increased yields. As indicated above, improved timing also was important in various of the cultural operations. The fact that cotton does not follow cotton on the same fields makes it possible to do a more effective job of preparing the seed bed for the crop, while the limited acres of cotton probably contributed to more timely and effective operations in irrigating, cultivating and other post-emergence tasks. Here again, both quantity and timing were important.

The alternative crops that Upper San Joaquin Valley farmers substituted for cotton on most of the diverted acres were pretty much the established minor crops that they already had grown or had seen their neighbors grow. The growers with unfavorable water conditions and those on the less productive soils increased acres in winter grain, principally barley, and alfalfa seed. They fallowed a part of the diverted acres, and the number that they thus diverted entirely from crops tended to increase as the size of the farm increased. More favorably situated farmers turned principally to summer crops, usually alfalfa hay, corn, and other forage and grain. More adequate

supplies or less costly water made this step practicable for them. Potatoes did not offer an opportunity to use acres diverted from cotton in 1954 or 1955, inasmuch as farmers growing this crop already were trying to place production more nearly in line with market demand at higher prices than in 1953. Considering the Upper San Joaquin Valley as a whole, grains, fallow, and alfalfa hay absorbed most of the acres diverted from cotton in 1954 and 1955.

Prices had much to do with the success of producers in their attempts to maintain farm profits in spite of the 1954 and 1955 cotton allotments. Rises occurred for cotton, potatoes, and alfalfa hay, while cottonseed, the grains, and alfalfa seed experienced declines. As already suggested above, it appears evident that increased total production had much to do with the declines for the latter products, and particularly for their relatively sharp declines at harvest time.

Cotton was the highest profit-earner on farms of all sizes analyzed in this study, both before and after the cotton allotment programs. On four of these models it was the only source of net returns above variable expenses and fixed costs, not including an allowance for land in 1953. Cotton also was the only source of such net earnings in 1955 for the farms with less favorable soil and water conditions. Other crops without a net return above such costs, did, however, show an excess above variable expenses, and thus helped to meet fixed or overhead costs. Potatoes also showed profits under 1955 price conditions, though both prices and profits remained under usual levels for this crop during most of the recent post-war years. The price for alfalfa hay also was much lower in 1953 than has been typical during recent years, and this fact explains losses or relatively low earnings for this crop during that year. Yield possibilities for grains with existing varieties

and cultural methods seriously limit the profit opportunities for these crops in the Upper San Joaquin Valley at prices prevailing during recent years. Alfalfa seed possibly offers more promise for the future, from both the price and yield standpoints.

We analyzed the entire farm business for each of the nine farm models studied in order to determine the full economic impact of farm adjustments accompanying the 1954 and 1955 cotton acreage programs. The following measures of farm earnings are useful to indicate the effects of the programs on farm earnings and to compare these effects according to farm size and organizational structure:

(1) Receipts minus costs - total farm gross receipts minus all farm expenses and costs except interest on land and the imputed value of operator's labor (less the actual value of hours he worked on the farm).

(2) Return to capital and management (or profit) - the net return from the farm business after deducting all costs and expenses, including an imputed value for the operator's own labor.

(3) Rate earned on investment (or rate of profit) - return to capital and management expressed as a percentage of the average farm capital investment.

(4) Net cash balance - actual cash receipts less cash costs and expenses or cash outlays on the farm business..

Our most serious problem in calculating the rate of return to capital and management of profit was to find the value of farm land, which we needed to determine a precise value for total farm investment. We were unable to obtain the actual value of the farm land; hence, we did not succeed in solving this problem. What we did was to use arbitrary estimates of $400.00 and $240.00 per acre, bare land value, for the farms consisting primarily of grades one and three land respectively. In order to arrive at market value for such land, it is necessary to add onto these estimates the values for buildings, and other improvements, and irrigation facilities attached to the

land. It would be purely accidental if the resulting total should approximate the actual selling price for any parcel of land in the Upper San Joaquin Valley. We suspect, actually, that our $400.00 and $240.00 estimates are well below the share of bare land in recent real estate transfers in the area. To the extent that this is true, the rates earned appearing here are deceptively high for the reason that the returns to capital and management in dollars are expressed as percentages of too low a total farm investment. We made such calculations, nevertheless, and use them in spite of the fact that we do not consider them precise, for the reason that they are highly useful in comparing the various models. We do not recommend them as a measure of absolute profit level for any given model. We do indicate in the data presented below the effects that a fifty per cent increase in land values would have on the profit rates in percentages, according to farm organization and size.

We present the following text table as a convenient means of summarizing our findings regarding the impact of the farm adjustments accompanying the cotton acreage allotments in the Upper San Joaquin Valley, so far as net cash returns, dollars of return to capital and management, and rate of the latter return or profit are concerned:

Farm Model		1955			1953		
		Net cash	Profit	Rate[a]	Net cash	Profit	Rate[a]
80-1	(C-A)	$ 9,480	$ 5,727	12.2%	$ 9,380	$ 5,900	12.6%
80-2	(C-P)	8,760	5,314	11.3	7,970	4,686	10.0
80-3	(C-B)	4,560	1,692	3.6	4,550	1,947	4.2
160-1	(C-AS-B)	8,721	2,302	3.4	9,467	3,613	5.4
160-2	(C-P-M)	18,272	11,827	12.6	15,649	9,910	10.6
160-3	(C-A-P)	18,470	11,945	12.7	17,140	11,094	11.8
320-1	(C-AS-B)	20,150	12,035	9.7	25,420	18,642	15.0
320-2	(C-A-P)	40,950	33,656	19.2	46,200	38,578	22.0
320-3	(C-P-A)	37,740	29,954	17.0	32,290	25,664	14.6

(The letters in parenthesis for each of the farm models are the initials of the following crops: A---alfalfa hay, AS---alfalfa seed, B---barley, C---cotton, M---milo, and P---potatoes. These letters are listed in order of importance of the crops).

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[a] These profit rates are heavily influenced by the valuation of the farm land (bare basis) which we estimated at $400 per acre for the farms on the better soils and $240 per acre on the less favorably situated farms. We are well aware that these estimates are arbitrary and may vary widely from the current market values of this land, quite likely on the low side. If our estimates are as much as fifty per cent low, for example, the total farm rates of profits would be as indicated below, according to farm organization and size:

Year	80-1	80-2	80-3	160-1	160-2	160-3	320-1	320-2	320-3
					Per cents				
1955	9.1	8.4	3.4	2.7	9.4	9.5	7.4	14.0	12.5
1953	9.4	7.4	4.0	4.2	7.9	8.8	11.5	16.1	10.7

The data available for this study and our analysis support the following observations regarding the impact of farm adjustments accompanying the 1954 and 1955 cotton allotment programs:

(1) We did not find it feasible to analyze an average or typical farm model; the many variations in farm resources, organization, and size seemed to us to make such an analysis less useful than one directed to several models based on these existing variations. It is important to note that the actual average cotton yield has been about two bales of lint per acre in Kern County during the past two years. Those desiring to do so may use this yield to place any particular analysis model in perspective relative to the overall level of cotton production in the Upper San Joaquin Valley.

(2) Farmers on units with water in limited supply or high in cost, and who also were farming mostly grade three land (the 80-3, 160-1, and 320-1 models), suffered the most serious cuts in farm earnings. Such growers failed to find alternative uses for the land diverted from cotton that would leave a margin above other costs to pay interest on the capital invested in the land, or help pay the imputed cost of the operator's time not actually spent in field operations.

(3) Farmers on the better land and without relatively serious water problems were able to adjust to the cotton acreage reductions between 1953 and 1955 with only a slight drop in earnings, or even succeeded in raising their profits. This fact reflects greater success in selecting profitable alternatives to cotton, somewhat lower costs, and favorable prices, or some combination of these factors.

(4) There is little evidence that the operators on 160-acre farms had any marked advantage in rate earned over those farming 80-acre units. The farmers on the larger units did receive larger dollar amounts of both profit and net cash income, and thus benefited from larger size of business.

(5) Growers operating the 320-acre farms enjoy a distinct advantage in higher rates of profit, as well as in dollar amounts, as compared with those on the 160- or 80-acre units. This grows out of better resource use and lower unit costs in producing cotton and other crops, and allows these farmers greater economic strength in making necessary financial adjustments to factors tending to depress earnings.

(6) Farmers operating farms in all size groups cushioned the impact of the cotton allotments by changing resource use and increasing cotton yields. They offset about one-fourth of the physical acreage cuts by such measures, and thereby accomplished about two-thirds of the gain that they made in cotton earnings during 1955 as compared with what such earnings would have been at 1953 yields and prices.

(7) The specific changes in resource use on farms of all sizes included land selection, rotating cotton-growing fields in other crops, better timing in preparing the seedbed, and in performing other operations, and increasing inputs of irrigation water, fertilizer, labor, field power, and machinery. Improved timing in applying the latter kinds of inputs also favored higher yields.

(8) An unfavorable change in resource effectiveness with the reduced cotton acres is the difficulty that operators with fewer than 100 acres in cotton have in using enough of the capacity of a mechanical cotton harvester to obtain its potential savings in picking cost as compared with hand operations. The operators on the 160-acre units, thus, find that their cotton acres under 1955 allotments makes it doubtful that they can use a mechanical harvester to increase profits. There are other similar unit capacity problems associated with the reduced cotton acres on this and other sizes of farms, but the harvester appears to be the most glaring example.

(9) The net effects of price changes between 1953 and 1955 favored Upper San Joaquin Valley farmers in their efforts to maintain farm profits. Prices rose for the crops that have been the best profit-makers in the past, namely, cotton, potatoes, and alfalfa hay. The more important drops occurred in grain and alfalfa seed prices. The decline in cottonseed prices was more than offset by the gain in the price for cotton lint. Farmers on the units with high water costs and soil problems benefited from gains in cotton prices but not from the others; the reason being that their situation limits them to winter grain or such low-water-use summer crops as alfalfa seed.

(10) The price rise for cotton lint was responsible for about one-third of farmers' success in maintaining cotton earnings in spite of the allotments. Without this favorable situation, the growers with the water and soils problems would have had a sharper income drop than they did.

(11) The rise in potato prices between 1953 and 1955 largely explains the increase in both dollar profits and the rate earned on investment on the cotton-potato farms (the 80-2, 160-2, and 320-3 models). Potatoes are established in the farming organizations of these units because selling prices have enabled growers to profit from this crop in the past. More normal potato prices than those in either 1953 or 1955 would favor such earnings in the future, and, thus facilitate the problem of operators on the cotton-potato farms when they must adjust to a less favorable cotton situation.

(12) There are other types of production that may prove to be profitable alternatives to cotton if the 1955 level of cotton allotments appears likely to continue for an indefinite period. Some, such as vegetable, seed, and other annual specialty crops, may involve

added resources and new technology or skills, or depend on special marketing outlets and arrangements to lessen uncertainty. Others, such as fruits, require heavy investments and a waiting period before the growers begin to receive returns. The pattern of adjustments that Upper San Joaquin Valley operators made during the period 1953-1955 indicates that they are disposed to make their adjustments with annual crops that they are used to producing until developments convince them that it is to their advantage to shift into production involving such problems.

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UNIVERSITY OF CALIFORNIA

FARM ADJUSTMENTS AND EARNINGS UNDER 1955 COTTON ACREAGE ALLOTMENTS

2. Small Grape Cotton Farms on the San Joaquin Valley Eastside, 1953–1955

D. C. Athanassatos and Trimble R. Hedges

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Charles C. Carpy, Assistant Specialist in the Experiment Station and on the Giannini Foundation, was primarily responsible for collecting the field data. John C. Crecink, Agricultural Economist of the Production Economics Branch, Agricultural Research Service, U. S. Department of Agriculture, assisted in this work.

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We are indebted to farmers, dealers, and representatives of various state and federal agencies serving agriculture for making information and data available for this investigation. We particularly thank the California Agricultural Stabilization and Conservation Committee for permitting us to use aggregate data from their county files, and the California Agricultural Extension Service for aiding and facilitating our questionnaire survey of farmers holding acreage allotments in 1954.

Finally, the credit for the statistical and stenographic work goes to the personnel in the Giannini Foundation.

D. G. Athanassatos

Trimble R. Hedges

FARM ADJUSTMENTS AND EARNINGS UNDER 1955 COTTON ACREAGE ALLOTMENTS

2. Small Grape-Cotton Farms on the San Joaquin Valley Eastside

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FARM ADJUSTMENTS AND EARNINGS UNDER 1955 COTTON ACREAGE ALLOTMENTS

2. Small Grape-Cotton Farms on the San Joaquin Valley Eastside

HERE ARE THE HIGH LIGHTS OF THE FINDINGS:

SOILS, sandy loams and mostly in grades 1 to 3, and the long, hot growing season favors grapes; but irrigation is essential and pests present problems.

See pages 7 to 12

SMALL FARMS (60 acres of cropland or less) are most numerous in the eastside, and the percentage of operators with grapes or other fruit is greatest in these smaller sizes.

See pages 13 to 19

CAPITAL INVESTMENTS ARE LOW, and land makes up the greater portion on the grape-cotton farms.

See pages 21 to 24

MORE FERTILIZER AND ADDED ACRES IN GRAPES were the principal adjustments that grape-cotton farmers made after cotton acreage allotments. They operate such small units that they have little opportunity for adjustments.

See pages 27 and 28

LABOR IS THE BIG COST ITEM, and grape-cotton farm operators have minimum equipment.

See pages 32 to 38

PRICE DECLINES FOR EMPEROR GRAPES cut sharply into earnings for the grape-cotton farms between 1953 and 1955 even though cotton prices rose.

See pages 39 to 47

INADEQUATE SIZE OF BUSINESS EXPLAINS LOW EARNINGS on small eastside grape-cotton farms under the 1953-1955 price conditions.

See pages 48 to 53

SMALL-SCALE OPERATIONS require grape-cotton farmers to rent equipment or hire custom service for many operations which makes for high production costs on both this work and that which they perform with their own machinery.

See Appendix Tables, pages 54 to 76

FARM ADJUSTMENTS AND EARNINGS UNDER 1955 COTTON ACREAGE ALLOTMENTS

2. Small Grape-Cotton Farms on the San Joaquin Valley Eastside[1]

D. G. Athanassatos[2]

Trimble R. Hedges[3]

SMALL GRAPE-COTTON PRODUCERS RAISE COTTON AS A SECONDARY CROP; ALLOTMENT PROBLEMS DIFFER ON THESE GRAPE-COTTON FARMS FROM THOSE ON SPECIALIZED FIELD CROP FARMS

Cotton Acreage Allotments Lessen the Producer's Opportunity to Supplement His Fruit Earnings with Cash Crops

This study undertakes to identify and measure the effect of cotton acreage allotments on small grape-cotton farms in the San Joaquin Valley eastside (Figure I).[4] The critical aspect of this problem centers on resource use and earnings. The California Agricultural Stabilization and Conservation Committee assigned cotton acreage allotments to individual

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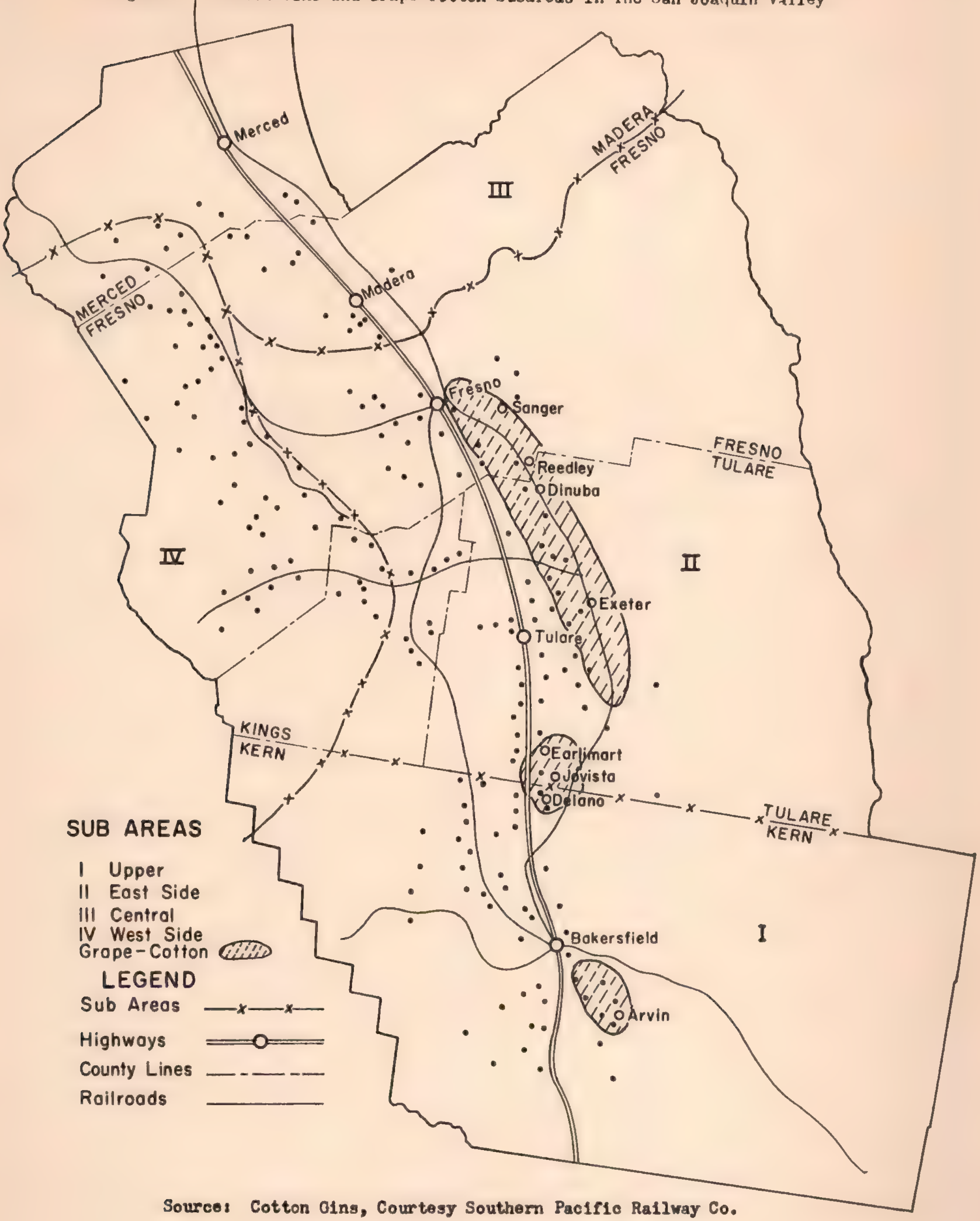
[1] This report is the second of a series based on detailed investigations of the changes in farm organization, production, and earnings under the cotton acreage allotments beginning in 1954. This research comes under California Agricultural Experiment Station Project No. 1641 and is partially supported under Line Project PE-E 3-5 (W) of the Production Economics Research Branch, Agricultural Research Service, U. S. Department of Agriculture.

[2] D. G. Athanassatos was a research fellow during 1955-56, Department of Agricultural Economics, University of California, Berkeley, California. The order of listing for the authors does not imply seniority of authorship.

[3] Trimble R. Hedges is Professor of Agricultural Economics, and Agricultural Economist in the Experiment Station and on the Giannini Foundation, University of California, College of Agriculture, Davis.

[4] The San Joaquin Valley eastside includes all of Tulare and eastern Fresno counties and the eastern portion of Kings County. Not all this area is equally suited for grape production.

Figure I. Cotton Gins and Grape-Cotton Subareas in The San Joaquin Valley



Source: Cotton Gins, Courtesy Southern Pacific Railway Co.

farmers in the grape-growing areas of the San Joaquin Valley as well as to other cotton growers in early 1954.[1/]

By 1955, the allotment program had reduced California cotton acreage from its 1953 level by about 45 per cent. The statutes and regulations are such that these cuts may be somewhat less severe for farmers producing fewer than 15 acres of cotton before allotments; often no cut at all is required for the farmers who previously had produced not to exceed 5 acres of cotton. Otherwise, available data indicate that percentage cuts in cotton acres were fairly uniform among farms of varying size.

A large proportion, about 65 per cent, of the total cotton allotments in the San Joaquin Valley eastside went to operators on farms with 60 acres or less of open cropland. Many of these small growers also produce grapes or tree fruit. For such operators, the cotton crop may be of secondary importance and represent primarily a source of supplementary income. Usually, the grower is interested chiefly in the fruit enterprise and gives it most of his attention. The effects of cotton allotments on such farms might vary considerably from those on the larger and more specialized field crop farms in other portions of the San Joaquin Valley. If so, it is important to discover what these differences are and specifically to evaluate the effects of the cotton allotment program on the small grape-cotton farmers.

We undertook this study to measure as precisely as possible the impact of the cotton allotment program on the small family operated grape-cotton

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[1/] The cotton acreage allotments resulted when farmers voted favorably in a national referendum on marketing quotas that the Secretary of Agriculture announced in late 1953. The Secretary had no alternative under the federal law than to establish marketing quotas. See Hedges, T. R., and C. O. McCorkle, Jr., Cotton Quotas and Allotments and California Farm Adjustments in 1954 (Berkeley: University of California, Division of Agricultural Sciences, Agricultural Experiment Station, January, 1954), 72p. (Giannini Foundation Mimeographed Report No. 161.) Processed.

farms in the San Joaquin Valley eastside. In order to do this, we found it necessary to analyze completely the resources, production methods, inputs and yields, and financial returns on these farms. Finally, we determined the gross value of production, costs and expenses of all inputs, and net returns on these farms both before and after cotton allotments.

We had to find answers to a number of subordinate questions in order to reach our final goal. What land, water, and other resources do grape-cotton farmers use? What are the production methods, physical inputs, and costs in producing grapes and cotton on these small farms? What economic factors affect prices both for inputs and products and, through them, the total receipts, costs, and earnings? What was the resource-use pattern on grape-cotton farms before allotments, considering land, labor, power machinery, and irrigation water? What changes did farmers make in resource and their use after allotments? What changes in yields and prices occurred from 1953 to 1955? The answers to these and other related questions are essential in order to measure the earnings effects of the cotton acreage allotment program and to be able to interpret and analyze these results in relationship to important causal factors both on and off the farm.

Farmers, Farm Service Agencies, and Official Sources Supplied the Facts for This Analysis

The facts for the analysis in this study came from a wide range of sources. Soil Survey reports, Weather Bureau releases, and U. S. Bureau of Reclamation studies supplied information on the natural resource base for the San Joaquin Valley eastside. Information on farm size and organization came from the California State Agricultural Stabilization and Conservation Committee records, questionnaires returned by about a third of the cotton farmers in the San Joaquin Valley eastside, and statements from

about 40 individual farmers.[1] We found out from these sources the total farm acres, crop acres, and how farmers distributed their farm land among various crops. Farmer interviewees furnished most of the information regarding technology and production practices. In addition, the questionnaires supplied important evidence regarding cotton fertilizing practices.

The farmers who cooperated in the interviews furnished the detailed information on their equipment and other inputs and their detailed procedures in producing cotton and other crops. Tulare County, in which we interviewed individual farmers, ranks second after Fresno County in grape production. About 60 per cent of the total number of farmers reporting cotton allotments in 1954 had 60 acres of cropland or less, and 56 per cent of these smaller farms had fruit.

We called upon representatives of all agencies serving farmers in order to obtain price information for both 1953 and 1955. We also obtained valuable information from these agencies regarding the kinds and amounts of materials and services that farmers use to produce grapes and cotton.

The Analysis Includes Budgeting for Both the Individual Enterprises and the Entire Farm Business

This study determines and compares net farm returns before and after allotments by a detailed budgeting process. We developed the farm organization that we use in the analysis according to the information from the various sources outlined above. We believe that this 30-acre model represents with reasonable accuracy the dominant characteristics of the family-operated small grape-cotton farm occurring in large numbers in the eastern portion of the San Joaquin Valley.

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[1] We interviewed 10 farmers operating small grape-cotton farms in the Dinuba area and 30 additional Tulare County cotton growers in 1955.

The basic farm organization data relate to the three-year period 1953-1955. The analysis includes prices for the years 1953 and 1955. In this report we analyzed farm organization characteristics, inputs and costs, and returns for producing Thompson Seedless raisins, Emperor grapes, and cotton (both alone and interplanted with grapes) on small farms in the San Joaquin Valley eastside. Finally, we summarize this enterprise information and use it to analyze and evaluate the impact of cotton acreage allotments on the entire family grape-cotton farm.

Steady to Slightly Rising Nonfarm Prices and Declining Farm Prices Featured the Analysis Period, 1953-1955

The farm cost picture was reasonably steady during the three years beginning with 1953, the last year prior to the current cotton acreage allotment program, and ending with 1955, the last year of the study. We used one set of prices for calculating input expenses and costs for both 1953 and 1955. Among the farm product prices, grapes, raisins, and cotton seed were lower in 1955 than in 1953 (raisins only slightly), while cotton was higher.

We used $160.00 per ton as the price for raisins in 1953 and $159.00 per ton as the 1955 price. The average price of $2.38 per 28-pound box for Emperor grapes in 1953 compares with the five-year average price of $1.77 and the $1.78 price in 1955. The higher price in 1953 was mainly due to the small crop of that year.

The average price of cotton lint was $148.99 per bale (478 pounds of lint) in 1953 and $167.30 per bale in 1955. The average price of cotton seed was $53.00 per ton in 1953 and $46.00 per ton in 1955.

SOIL AND CLIMATIC FACTORS FAVOR PRODUCTION, BUT EFFECTIVE PEST CONTROL MEASURES ARE ESSENTIAL TO MAINTAIN YIELDS AND QUALITY OF BOTH GRAPES AND COTTON

About 40 Per Cent of the Soils are of Grades 1 and 2, and Another 25 Per Cent Grade 3; Loams and Sandy Loams Predominate

Soils in the San Joaquin Valley eastside are very suitable for grape production. About 65 per cent of the soils in the eastside area for which detailed soil survey reports are available are in grades 1 to 3 with loams and sandy loams typical (Table 1).

In the area near Dinuba and Reedly, where we interviewed grape-cotton growers for this study, Greenfield sandy loam soils constitute most of the soil on the farms included. This soil is a granitic alluvium. It has its source in granitic rocks and occurs as water-deposited alluvium. In addition, there are several shallow phases of Greenfield sandy loam, Madera sandy loam, Tujunga sandy loam and Delhi loamy sand. In general, the soils on these farms have a high natural fertility level. Thompson Seedless grapes for raisins and Emperors for table use predominate.

High Temperatures and Low Rainfall are Favorable to Grape and Raisin Production if Adequate Supplies of Moderately Priced Irrigation Water are Available

The climate of the Dinuba area is typical of the San Joaquin Valley eastside; it is semiarid (Figure II). The average annual rainfall at Visalia, 16 miles south, is 9.45 inches. More than 8 inches of this amount falls between November and April. The annual rainfall generally is not sufficient to produce any commercial crops except winter crops such as grains and grasses. Practically all grapes, cotton, and other summer crops require irrigation. The long, dry summer with low humidity, however,

TABLE 1

Soils by Survey Areas and Grades: Eastside San Joaquin Valley

Soil classification		Soil survey areas									
Grade	Index	Fresno		Hanford		Pixley		Visalia		Total	
1	2	3	4	5	6	7	8	9	10	11	12
		acres	per cent of total	acres	per cent of total	acres	per cent of total	acres	per cent of total	acres	per cent by grades
I[a/]	90 - 100	39,424	4.5			90,176	15.7	108,736	20.0	238,336	57.8
	80 - 89			81,260	58.8	29,824	5.2	62,848	11.6	173,932	42.2
	Subtotal	39,424	4.5	81,260	58.8	120,000	20.9	171,584	31.6	412,268	100.0
	Per cent										19.4
II[b/]	70 - 79	6,016	.7	6,754	4.9	83,392	14.5	43,776	8.0	139,938	38.8
	60 - 69	76,032	8.8	33,748	24.4	46,784	8.2	64,192	11.8	220,756	61.2
	Subtotal	82,048	9.5	40,502	29.3	130,176	22.7	107,968	19.8	360,694	100.0
	Per cent										17.0
III[c/]	50 - 59	212,032	24.4			94,272	16.4	33,984	6.2	340,288	55.3
	40 - 49	225,280	26.0			33,088	5.8	17,152	3.2	275,520	44.7
	Subtotal	437,312	50.4			127,360	22.2	51,136	9.4	615,808	100.0
	Per cent										29.0
IV	20 - 39	257,856	29.7	5,470	4.0	41,728	7.3	102,464	18.8	407,518	55.4
V	10 - 19	2,624	.3	8,768	6.3	120,256	20.9	28,608	5.3	160,256	21.8
VI	0 - 10	48,576	5.6	2,240	1.6	34,560	6.0	82,240	15.1	167,616	22.8
	Subtotal	309,056	35.6	16,478	11.9	196,544	34.2	213,312	39.2	735,390	100.0
	Per cent										34.6
	Total	867,840	100.0	138,240	100.0	574,000	100.0	544,000	100.0	2,124,160	100.0

(Continued on next page.)

(Table 1 continued)

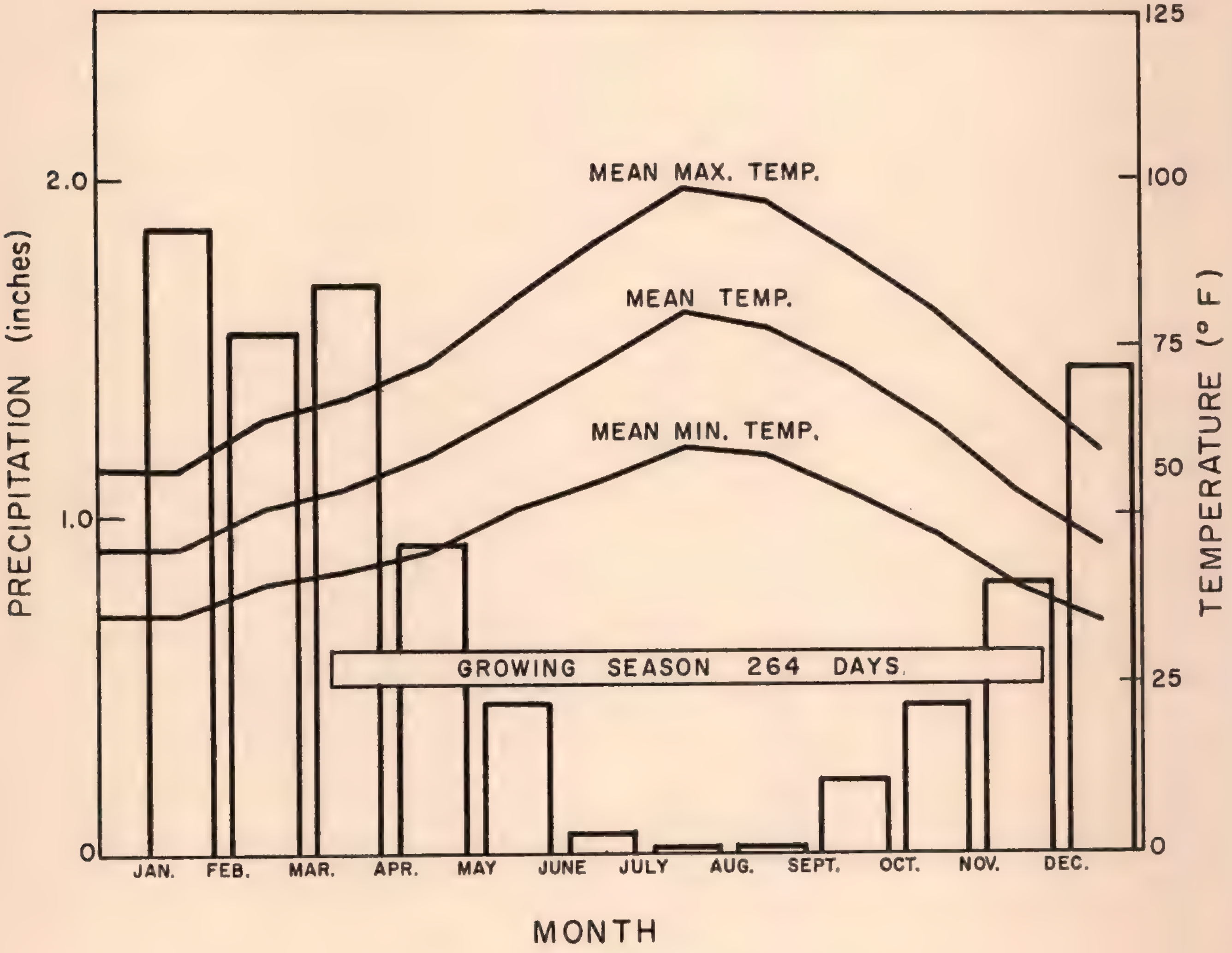
a/ Sandy loams and loams; Fresno and Hanford areas--Hanford series, Pixley area--Cajon, Chino, Chualar, Foster, Hanford, Hesperia, Honcut, and Greenfield series, Visalia area--Cajon, Chino, Foster, Hanford, Honcut, Greenfield, Ramona, and Visalia series.

b/ Loams, sandy loams, and clay loams; Fresno--Madera series, Hanford--Chino, Foster, and Traver series, Pixley--Cajon, Chino, Chualar, Delano, Ducor, Exeter, Foster, Traver, Tulare, and Tujungo series, Visalia--Cajon, Chino, Dinuba, Exeter, Farwell, Greenfield, Honcut, Traver, and Visalia series.

c/ Sands to adobe; Fresno--Centerville, Fresno, Hanford, Holland, Madera, Merced, Sheridan, and Sierra series, Pixley--Cajon, Chualar, Ducor, Exeter, Hovey, Las Posas, Linne, Madera, Porterville, Tujunga, and Vista series, Visalia--Chino, Exeter, Foster, Hovey, Madera, Porterville, and Vista series.

Sources: Soil survey reports as listed.

Figure II. Precipitation, Temperatures, and Growing Seasons; Visalia[1]



[1] The San Joaquin Valley Eastside Grape-Cotton Subareas have scant rainfall, hot summers, and a long growing season. Irrigation is required for summer crops.

Sources: Climatological Data, U. S. Weather Bureau; Period Averages: Precipitation--53 years; Temperatures--mean 41 years, maximum and minimum 28 years.

provides ideal conditions for growing crops and for the raisin grapes to mature and dry.

Temperature data also are available for the Visalia area. The annual temperature was 62° F. over a 41-year record period. The winter months' temperatures are relatively mild. The average monthly range in temperature between the mean-maximum and the mean-minimum is 31° F. with the range widest in the summer when it may be as much as 38° F. in July and August. The summers are very hot; maximum temperatures reach 115° F. at times. The lowest temperature recorded was 13° F. in January.

The average length of growing season is 262 days, based on an average date of March 11 for the last killing frost in the spring and an average date of November 28 for the first killing frost in the fall.

Ample irrigation water is essential to produce profitable crops of grapes and cotton because the limited annual rainfall in Tulare County reduces production to uneconomic levels without irrigation.

Wells supplied all irrigation water used by the interviewees, and they did all irrigating by the furrow method. The average pumping lift was about 35 feet on the farms whose operators supplied interview data. Many grape-cotton farmers have limited irrigation water during the summer because of drawdown and resultant low water level in the peak use periods. This is why winter irrigation is a common practice. Farmers irrigate during these off-season months in order to store considerable amounts of water in the soil for later use.

Pests Require A Definite Control Program

The most important disease, both for Thompson Seedless and Emperor, is mildew, to prevent which operators apply sulfur dust. They control black measles on Emperor grapes by treating with sodium arsenite.

The most serious insect pests that grape growers must combat in the Dinuba area of the eastside are grape leafhoppers and grape leaffolders. Both require thorough treatment with chemical insecticides to control them on Thompson Seedless and Emperor grapes.

The most important insect enemy on cotton is spider mite. Dusting is the standard practice for controlling this pest.

Hand weeding is the most common practice on cotton due to the small acreage of the crop. Weeds in Emperor vineyards are controlled during the summer by mowing.

These various means of controlling diseases, insects, and weed pests require additional cash expenses and increase the cost of production. The operators cannot avoid these expenses, however, as the alternative is to accept almost certain reductions in yield or quality with consequent lowering of gross and net returns.

TYPICAL SMALL FAMILY FARMS ON THE SAN JOAQUIN VALLEY EASTSIDE DEPEND PRIMARILY ON RAISIN AND TABLE GRAPES AND, SECONDARILY, ON COTTON TO USE FAMILY LABOR AND PROVIDE INCOME

Cotton Allotment Holders With 60 Acres or Less of Open Cropland Made up Two Thirds of the Total on the Eastside in 1954; More Than One Half of These Small Operators had Fruit, in Addition to Field Crops

Small-sized cropland acreages dominated the total of all eastside cotton allotment holders in 1954. Those with 60 acres or less in open cropland made up 65 per cent of all cotton allotments assigned by the various county agricultural stabilization and conservation committees in the eastside (Table 2). Although holders of such allotments were very important in number, they held only about 11 per cent of all the cropland included in holdings with cotton allotments. Similarly, cotton acres allotted to such allotment holders represented a small percentage of all the cotton allotted in the eastside. Their allotments included about 17 per cent of all cotton acres allotted in 1954, and we estimated that 1955 plantings by operators in these size groups also made up about the same proportion of all plantings on the eastside (Table 2).

Small growers also received acreage allotments, and, except for those producing 5 acres or less of cotton prior to the allotment program, these allotments represented cuts from the acres they had grown in 1953 and during the three years 1951-1953 (Table 3). The operators with 21 to 60 acres of open cropland averaged 26.2 acres of cotton in 1953 and 22.8 acres for the 1951-1953 average. Their 1955 plantings at 12.7 acres represent a 10-acre cut from the three-year average.

The small amount of open cropland and cotton on these farms of 60 acres or less suggests that many operators must have other sources of

TABLE 2

Farm Size, Total Cotton Acres, and Total Acres Diverted 1954 and 1955: San Joaquin Valley Eastside

Cropland class intervals	Number of farms	Cropland		Total cotton acres				Diverted acres	
		Average per farm	Total	3-year average 1951-1953	1953	Final allotment 1954	Acres planted 1955[a]	3-year average to 1954	3-year average to 1955
	1	2	3	4	5	6	7	8	9
		acres							
1 - 20	3,424	12.7	43,520	27,086	26,725	30,539	24,238	3,453	- 2,848
21 - 60	2,805	37.5	105,160	63,975	60,599	45,010	35,729	- 18,965	- 28,246
61 - 100	1,119	78.0	87,298	52,096	48,490	34,028	27,026	- 18,068	- 25,070
101 - 220	1,168	149.0	174,054	99,009	90,784	64,610	51,299	- 34,399	- 47,710
221 - 420	593	298.2	176,858	98,806	90,161	63,889	50,721	- 34,917	- 48,085
421 - 660	237	518.1	122,798	61,518	54,661	40,813	32,397	- 20,705	- 29,121
661 - 1,100	141	842.1	118,735	58,769	54,763	39,122	31,071	- 19,647	- 27,698
1,100 + above	122	4,191.6	511,373	164,109	157,217	110,183	87,469	- 53,926	- 76,640
Total	9,609	139.4	1,339,796	625,368	534,910	428,194	339,950	-197,174	-285,418

[a] Estimated.

Source: California Agricultural Stabilization and Conservation Committee.

TABLE 3

Farm Size, Total Cotton Acres, and Average Acres Diverted 1954 and 1955: San Joaquin Valley Eastside

Cropland class intervals	Number of farms	Cropland		Average cotton acres				Diverted acres	
		Average per farm	Total	3-year average 1951-1953	1953	Final allotment 1954	Acres planted 1955[a]	3-year average to 1954	3-year average to 1955
	1	2	3	4	5	6	7	8	9
		acres							
1 - 20	3,424	12.7	43,520	7.9	10.4	8.9	7.1	1.0	- 0.8
21 - 60	2,805	37.5	105,160	22.8	26.2	16.0	12.7	- 6.8	- 10.1
61 - 100	1,119	78.0	87,298	46.6	50.5	30.4	24.2	- 16.1	- 22.4
101 - 220	1,168	149.0	174,054	84.8	87.0	55.3	43.9	- 29.5	- 40.8
221 - 420	593	298.2	176,858	166.6	161.9	107.7	85.5	- 58.9	- 81.1
421 - 660	237	518.1	122,798	259.6	248.5	172.2	136.7	- 87.4	-122.9
661 - 1,100	141	842.1	118,735	416.8	411.8	277.5	220.4	-139.3	-196.4
1,100 + above	122	4,191.6	511,373	1,345.2	1,288.7	903.1	717.0	-442.0	-628.2
Total	9,609	139.4	1,339,796	65.1	55.7	44.6	35.4	- 20.5	- 29.7

a/ Estimated.

Source: California Agricultural Stabilization and Conservation Committee

income, but the Stabilization and Conservation Committee data furnish no information on this matter. Additional information from 1,900 allotment holders on the eastside who returned usable questionnaires in 1954 does throw some light on this question. The small operations with 60 acres or less of open cropland represent about 60 per cent of these cooperators who returned questionnaires; of this number, 56 per cent indicated that they have fruit acreages in addition to their open cropland (Table 4).

Questionnaire returns for Tulare County alone provide some evidence regarding the relative importance of grapes and tree fruit in the total fruit acreages on small farms. About 25 per cent of the cooperators indicated that they have mature grapes, averaging 15.1 acres on the farms with 20 acres of open cropland or less and 23.6 acres for the units with 21-60 acres (Table 5). This percentage is slightly higher (about 30 per cent) if we include nonbearing acreages.

A general knowledge of relative gross and net returns and the relative acreages of grapes and cotton would indicate that grapes are the primary source of income on the farms having them and that cotton is a secondary product. It is evident, further, that such grape-cotton farms are concentrated among holders of the smaller cotton allotments. Over four fifths of the cooperators reporting grapes were in these two small-sized groups (Table 5).

The Analysis Model Represents Family Grape-Cotton Farms on the Eastside

All small farms reporting in either the Stabilization and Conservation Committee allotment-holder list or by questionnaire grew cotton in 1954. The questionnaire reports indicate that small acreages of alfalfa hay and irrigated pasture were the only other crops appearing on any important fraction of the

TABLE 4

Land Use on Cotton Farms, 1953-1955: San Joaquin Valley Eastside

Cropland class intervals	Mid-point	Number of farms	Net crop acres		Fruit		Noncultivated		Total farm	
			Total	Average	Number reporting	Total	Number reporting	Total	Total	Average
	1	2	3	4	5	6	7	8	9	10
1- 20	10	546	7,114	13.0	355	4,915	160	801	12,830	23.5
21- 60	40	612	22,949	37.5	292	5,201	224	1,714	29,864	48.8
61- 100	80	255	20,032	78.6	83	2,159	78	1,354	23,545	92.3
101- 140 141- 180 181- 220	160	254	38,212	150.4	82	3,924	85	3,047	45,183	177.9
221- 260 261- 300 301- 340 341- 420	320	120	35,192	293.3	29	881	41	6,509	42,582	354.8
421- 500 501- 580 581- 660	540	51	25,751	504.9	7	763	17	1,873	28,387	556.6
661- 780 781- 940 941- 1,100 1,101- 2,000 2,001- 5,000 5,001-10,000	5,330	67	111,932	1,670.6	10	4,960	28	23,057	139,949	2,088.8
Total		1,905	261,182	137.1	858	22,803	633	38,355	322,340	169.2

Source: Questionnaire returns, 1954.

TABLE 5

Total and Average Acres Per Farm: Fruits, Grapes, and Noncultivated Lands, 1954, Tulare County

Cropland class interval	Mid-point	Number of farms	Mature tree fruit			Mature grapes			Other fruit			Noncultivated		
			Farms reporting	Total	Per farm	Farms reporting	Total	Per farm	Farms reporting	Total	Per farm	Farms reporting	Total	Per farm
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
				acres			acres			acres			acres	
1- 20	10	208	45	506	11.2	67	1,012	15.1	17	227	13.4	53	251	4.7
21- 60	40	225	37	506	13.7	40	945	23.6	15	117	7.8	67	557	8.3
61- 100	80	112	14	262	18.7	10	399	39.9	8	88	11.0	32	742	23.2
101- 140 141- 180 181- 220	160	119	18	897	49.8	9	349	38.8	9	184	20.4	43	1,749	40.7
221- 260 261- 300 301- 340 341- 420	320	56	3	28	9.3	4	71	17.8				15	1,072	71.5
421- 500 501- 580 581- 660	540	28	2	45	22.5							12	1,314	109.5
661- 780 781- 940 941- 1,100 1,101- 2,000 2,001- 5,000 5,001-10,000	5,330	15	1	5	5.0	1	4,268	4,268	2	17	8.5	8	13,083	1,635.4
Total		763	120	2,249	18.7	131	7,044	53.8	51	633	12.4	230	18,768	81.6

Source: Questionnaire returns, 1954.

farms. About 25 per cent of the allotment holders with 21-60 acres of open cropland grew the first crop in 1953, and the number increased to about 40 per cent under allotments in 1954. A similar proportion in this same farm size grew irrigated pasture in 1953 but added few recruits from among the other growers of similar size in 1954. A sprinkling of the allotment holders in the 1-20 and 21-60 crop-acre classes raised barley, milo, or field corn in 1953, and their number increased slightly in 1954. All these crops remained relatively unimportant in terms of either number of farms producing them or the acres that they occupied. The alfalfa hay and irrigated pasture tended to appear most consistently on cotton farms without commercial acreages of grapes.

We developed the grape-cotton model analyzed in this study as an owner-operation. The size is 30 acres of which 27 are in grapes or annual crops. The operators of such farms specialize in grape production. Two thirds of the total land in crops was in grapes during 1953 and slightly more than three fourths was so used in 1955. Operators on these farms planted young grapes as they decreased cotton acreage and interplanted a portion of the new vineyard with cotton (Table 6). Thompson Seedless for raisins occupied 15 acres in 1953 and 18 acres in 1955, the growers having added 3 acres of new vineyards in 1954. Emperor grapes were grown on only 5 acres in both years. Operators on these small grape-cotton farms grew cotton on 7 acres in 1953 but reduced this crop about 43 per cent by 1955 due to the acreage allotment program. Farmers also interplanted an acre of their cotton allotment on one new Thompson Seedless vineyard in 1955. The three acres not in grapes or open cropland are in the farmstead roads and other noncrop uses.

TABLE 6

Crops and Land Use on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside, 1953-1955

Year	Grapes 1	Cotton 2	Inter-planted 3	Total cropland 4	Non-cultivated 5	Total land 6
	acres					
Actual						
1953	20	7	--	7	3	30
1954	23	6	2	4	3	30
1955	23	5	1	4	3	30
Changes						
1953-1954	+3	-1	+2	-3	--	--
1954-1955	--	-1	-1	--	--	--
1953-1955	+3	-2	+1	-3	--	--
	per cent					
Actual						
1953	67	23	--	23	10	100
1954	77	20	7	13	10	100
1955	77	17	3	13	10	100
Changes						
1953-1954	+10	-3	+7	-10	--	--
1954-1955	--	-3	-4	--	--	--
1953-1955	+10	-6	+3	-10	--	--

Total Farm Capital Investments Were Relatively Low on Grape-Cotton Farms

Farmers operating the typical family grape-cotton farm on the eastside had total farm capital investments averaging $22,260 with over half of this amount in land (bare land is valued at $400 per acre in this analysis) (Table 7).[1] Land, vineyards, and improvements accounted for 76 per cent of the total investment. Power units and equipment account for slightly more than 17 per cent of the total capital invested. The grape-cotton farm is tooled up for specialized grape production and includes no cotton equipment except seedbed and cultivating machinery. Farmers rent from larger farms the remaining equipment necessary to produce cotton. Irrigation facilities and equipment represent about 7 per cent of the total capital investment (Table 8).

Operators on the Grape-Cotton Farms Plan Operations to Market Their Own Labor

Labor: Producers use relatively large amounts of labor to grow Thompson Seedless grapes for raisins and Emperors for fresh use.[2] The farm operators perform certain field operations: driving the tractor and pickup

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[1] We found it impracticable to determine a realistic current market value for bare land such as that operated by the farmers on the small grape-cotton farms in this study. We, therefore, prepared estimates, using the available rental and assessment values with appropriate adjustments. The $400 estimate that we indicate here has its greatest usefulness in making it possible to compare the relative returns of the several enterprises and in suggesting the relative importance of capital investment and labor as productive resources used by the operators of these farms. We do not suggest that this value represents the market value of the bare land, nor that the absolute levels of profit rates based on this value are reliable as indicators of the level of earnings on these farms.

[2] Calendars of operations and physical inputs for grapes and cotton appear in Appendix Tables 2-6.

TABLE 7

Crop Acreages and Yields on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside, 1953-1955

Crops	1953	1955	1953	1955	Yield unit	1953	1955
	1	2	3	4	5	6	7
	acres per farm		per cent of crop acres			yields per acre	
Thompson Seedless grapes (mature age)	15	15	55.5	55.5	ton	1.75	1.75
Thompson Seedless grapes (young)	--	2	--	7.4	ton	--	.60
Emperor grapes	5	5	18.5	18.5	ton	7.0	7.0
Cotton	7	4	26.0	14.8	bale	1.4	1.8
Thompson Seedless grapes (young) and cotton	--	1	--	3.8	bale	--	.9
Total	27	27	100.0	100.0		--	--

TABLE 8

Physical Resources and Investments on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside, 1953-1955[a]

Item and description	Size or capacity	Amount	New cost		Investment	
			Per unit	Total	Per unit	Total
	1	2	3	4	5	6
			dollars			
Land:						
Total farm	30 acres		400.00	12,000.00		12,000.00
Cultivated land	27 acres					
Thompson Seedless (mature)	15 acres		400.00	6,000.00	200.00	3,000.00
Thompson Seedless (young)	3 acres		225.00	675.00	225.00	675.00
Emperor	5 acres		400.00	2,000.00	200.00	1,000.00
Subtotal				20,675.00		16,675.00
Improvements:						
Shed		1		300.00		150.00
Irrigation facilities:						
Pumping plant (10 HP)	650 gpm	1		1,500.00		769.00
Well, casing (35' lift)	10" diam.	100'	3.60	360.00		180.00
Subtotal				1,860.00		949.00
Distribution system:						
Concrete pipes	12"	1,320'		1,100.00		550.00
Stands	1' x 36"	1		42.00		21.00
Valves, vineyards	4"	55	2.60	143.00		72.00
Vents	2' x 6"			8.00		4.00
Subtotal				1,293.00		647.00
Power:						
Wheel tractor	W-1	1		2,000.00		1,400.00
Transportation:						
Pickup	1/2 ton	1		2,000.00		1,200.00
Equipment:						
Plow	2-12"	1		445.00		222.00
Disc harrow	5'3"	1		300.00		150.00
Spring-tooth harrow	8'	1		160.00		80.00
Float		1		20.00		10.00
Bedder	2-12"			88.00		44.00
Cultivator	2 row	1		350.00		175.00
Duster		1		255.00		140.00
Vineyard trailer	2 wheel	1		250.00		138.00
Sweatboxes		250		563.00		282.00
Subtotal				2,431.00		1,241.00
Total				30,559.00		22,262.00

[a] Total capital investment in 1953 at 1955 prices was $21,586.00 per farm or $675.00 less than in 1955. The new Thompson Seedless acreage, planted in 1954, explains this difference.

truck and irrigating the crops. They hire labor for all other operations. The small grape-cotton farm employs no family labor other than the operator.

Operators on small grape-cotton farms use about 140 hours of labor in producing and harvesting one acre of Thompson Seedless raisins, 100 hours in production, and the remaining 40 in harvesting and curing the raisins. Irrigation demands the most time of any operation (32 hours) with pruning running a close second (27 hours). Farmers on these farms usually contract the harvesting labor and may hire labor to perform a portion of the other operations (Appendix Table 9).

Emperor grapes employ 229 hours of labor for all operations through harvesting or about 63 per cent more than the Thompson Seedless grapes for raisins. Harvesting, requiring 100 hours, is the largest labor operation in this crop, and in order to obtain the highest possible quality, the operators usually pay their harvest labor by the hour. Irrigating (43 hours) and pruning (25 hours) also are important labor-consuming operations in producing Emperors (Appendix Table 11). The operators usually contract packing.

As indicated above, operators on the small grape-cotton farms in the San Joaquin Valley eastside own a minimum of cotton equipment. They, therefore, incur heavy outlays for contracted operations in producing cotton, of which picking ($75.60 per acre with a 1955 yield of 1.8 bales) is the most important single item. Cotton labor, including harvesting, totalled about 120 hours per acre in 1955 and 100 hours in 1953 when the yield was 1.4 bales per acre. These operators usually contract hoeing, thinning, dusting, and sometimes other operations in addition to the hand picking. They would find it necessary to contract even more of their cotton field work were it not for their common practice of renting and operating field equipment that they do not own (Appendix Table 12).

Tillage Practices: Grape-cotton farm operators cultivate their vineyards intensively. They prepare the seedbed for cover crops by discing late in the fall or early in the winter. Later in the spring they plow down the cover crop and disc twice to destroy pruning brush. They control weeds on Thompson Seedless by plowing after the winter irrigation and cultivating after every other irrigation with a springtooth harrow. These growers level the soil between the rows before harvesting by dragging, and thus they prepare a place for the paper trays on which they dry the raisins (Appendix Tables 2 and 3).

The cultivation practices for Emperors include the same ones as for Thompson Seedless except that the operator omits dragging. In addition, however, the operator mows weeds during the summer to conserve moisture.

When irrigating, operators on the grape-cotton units distribute water by furrowing the soil between the grape rows (Appendix Table 4).

Cotton tillage practices are those commonly used in California (Appendix Table 5).

Materials: Farmers on the grape-cotton units use commercial fertilizer only on cotton. They typically applied 380 pounds of ammonium sulfate or the equivalent of 80 pounds of nitrogen per acre in 1953. They increased this amount to 480 pounds equivalent to 100 pounds of nitrogen in 1955.

In addition to applying inorganic fertilizer to cotton, these farmers plow down a cover crop on all of the grape acreage both Thompson Seedless and Emperors.

Disease and insect pest control require considerable material and expense. Farmers on the grape-cotton farms applied 35 pounds of sulfur per acre for powdery mildew on Thompson Seedless (four applications)

and 68 pounds of sulfur per acre on Emperor (eight applications). These growers control black measles by using 7.5 quarts of sodium arsenite per acre for Emperor (applied after pruning).[1]

Grape leafhopper control required 30 pounds of malathion--3 per cent per acre on both Thompson Seedless (two applications) and Emperors (two applications). Grape leaffolders required 20 pounds of cryolite--50 per cent per acre on Thompson Seedless (one application)--and 40 pounds of cryolite--50 per cent per acre on Emperor (two applications). These growers used smaller amounts of dusts on new vineyards of Thompson Seedless.

Cotton pest control required 60 pounds of 5 per cent DDT and 50 per cent sulfur per acre of cotton (two applications).

Growers on the grape-cotton units irrigated both vines and cotton. The limited annual rainfall makes irrigation indispensable. They commonly practice winter irrigation to store considerable amounts of water in the soil for the vines and lessen the demand for summer irrigating.

Typical amounts of water used vary from 36 inches for Thompson Seedless and cotton to 42 inches for Emperors and for cotton interplanted with Thompson Seedless (two years old). Wells typically supply all irrigation water used on cotton-grape farms, and the growers do all irrigation.

1/ They used a solution of 3 quarts of sodium arsenite per 100 gallons of water. The total amount of spray was 250 gallons per acre.

LIMITED RESOURCES AND SMALL SCALE PERMITTED OPERATORS OF THE SMALL EASTSIDE GRAPE-COTTON FARMS LITTLE LATITUDE IN ADJUSTING TO THE COTTON ALLOTMENTS: THEY SHIFTED LAND TO GRAPES AND INCREASED COTTON INPUTS AND YIELDS

Farm Operators Intensified Their Cropping Systems and Increased Cotton Fertilizer Inputs and Yields.

The most important change in cropping organization that grape-cotton farmers made between 1953 and 1955 was to increase their grape (Thompson Seedless) acreage by three acres while reducing cotton by two acres. They accomplished this with no change in noncultivated land by interplanting one acre of cotton with the young Thompson Seedless vineyard (Table 6).

These growers, like those on the more specialized cotton farms in other areas of the San Joaquin Valley, succeeded in improving cotton yields. They reported yields averaging 1.4 500-pound bales (net 478 pounds of lint) per acre in 1953, and 1.8 bales in 1955 on open fields of cotton. Their yields on the cotton interplanted with grapes were lower; this cotton averaged .9 bale per acre in 1955 with no comparison available for 1953.

Added fertilizer inputs during 1955 represent the only clearly evident change in technology to explain the increased cotton yields. The fact that the grape-cotton growers planted more acres in grapes than they diverted from cotton indicates that they had little opportunity to gain any cotton yield advantage from more effective field selection. Their yield for the one acre of cotton that they interplanted with grapes was sharply lower in 1955 than the open field yield in either

year. It is possible, of course, that these family grape-cotton farmers did obtain some yield stimulus for cotton as a result of improved timing of inputs or other factors that we were unable to identify or quantify in this study.

Production Methods and Costs Remained Relatively Stable

Farm operators on eastside grape-cotton farms reported no important changes in production methods and practices between 1953 and 1955 other than the increase in cotton fertilizer and increased harvesting inputs accompanying higher cotton yields.

We used the same prices for materials such as fertilizers, seeds, dust and spray chemicals, fuels, and lubricants in analyzing the changes in earning from 1953 to 1955 (Appendix Table 1). This same policy held for contract services, rental rates, labor, and other similar services.

As a result of the above-indicated stability in both physical inputs and their prices, farmers on the grape-cotton farms experienced relatively little change in costs from 1953 to 1955. Total costs, excluding an allowance for interest on capital invested in land, declined $142.00 while cash expenses increased $40.00.

In order to study the cost of producing grapes and cotton, we grouped the various items under the principal headings of annual overhead (or fixed) costs and operating (or variable) expenses. The former includes real estate and vine taxes, improvement costs, depreciation, and interest on vineyards. We also determined the annual overhead costs for the power, equipment, and irrigating water.

Operating expenses include such items as power, equipment, materials, labor, contract services, and interest on operating capital.

Acreage Shifts Were Too Small to Have Imported Effects on Annual Overhead, Operating, and Total Costs for Power Units and Equipment. These Small-Scale Operations Have High Unit Costs.

Overhead costs for power units and equipment include the noncash items, depreciation and interest on investment, and cash outlays for taxes and insurance. We calculated total depreciation as the difference between original cost and the salvage value for each piece of equipment (Table 9). We then divided these amounts by the expected life to obtain the annual depreciation for the equipment items. Annual interest represents 5 per cent of the average investment figure. The latter value is equal to the original cost plus the salvage value divided by two. We calculated taxes according to data on assessments and tax levies in the survey area and obtained insurance costs from agencies serving local growers (Table 9).

Operating expenses include fuel, lubricants, and repairs. The charge for fuel and lubricants equals the annual use of a piece of equipment times the hourly cost of inputs. We based the charge for repairs on data reported by dealers and farmers. This item represents typical costs (Table 10).

Total overhead costs for power units and equipment amounted to $1,011.00 per farm (Table 9). Tractor and pickup costs accounted for 70 per cent of this total.1/

Total operating expenses accounted for $939.00 (Table 6) per farm with 68 per cent going for the tractor and the pickup (Table 10).

1/ The most common type of tractor was a general purpose 20-25 horsepower unit.

TABLE 9

Overhead Costs for Tractors and Equipment on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside, 1953-1955

Item	Original cost	Life	Salvage value	Average investment	Annual noncash overhead costs			Taxes and insurance	All overhead
					Depre- ciation	Interest	Total		
	1	2	3	4	5	6	7	8	9
	dollars					dollars			
Tractor, 20-25 h.p.	2,000.00	6	800.00	1,400.00	200.00	70.00	270.00	4.66	275.00
Pickup, .5 T	2,000.00	5	400.00	1,200.00	320.00	60.00	380.00	54.00	434.00
Plow, 2-12"	445.00	10	--	222.50	44.50	11.12	55.62	0.74	56.00
Disc harrow, 5'3"	300.00	10	--	150.00	30.00	7.50	37.50	0.50	38.00
Spring-tooth harrow 8'	160.00	15	--	80.00	10.66	4.00	14.66	0.27	15.00
Float	20.00	5	--	10.00	4.00	0.50	4.50	0.03	5.00
Bedder, 2-12"	88.00	10	--	44.00	8.80	2.20	11.00	0.15	11.00
Cultivator, 2-row	350.00	10	--	175.00	35.00	8.75	43.75	0.58	44.00
Duster	255.00	8	25.00	140.00	28.75	7.00	35.75	0.47	36.00
Vineyard trailer, 2-wheel	250.00	12	25.00	137.50	18.75	6.88	25.63	0.46	26.00
Sweatboxes, 250	563.00	10	--	281.50	56.30	14.08	70.38	0.94	71.00
Total				3,840.50	757.00	192.30	948.00	63.00	1,011.00

TABLE 10

Operating and Total Annual Costs for Tractors and Equipment on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside, 1953-1955

Item	All overhead	Operating costs			Total annual cost	Cost per hour
		Fuel and lube	Repairs	Total		
	1	2	3	4	5	6
	dollars					
Tractor, 20-25 h.p.	275.00	209.45	80.00	289.00	564.00	1.48
Pickup, .5 T	434.00	250.00	100.00	350.00	784.00	.078[a]
Plow, 2-12"	56.00	--	66.75	67.00	123.00	4.07
Disc harrow, 5'3"	38.00	--	45.00	45.00	83.00	2.15
Spring-tooth harrow 8'	15.00	--	4.80	5.00	20.00	.56
Drag	5.00	--	--	--	5.00	.89
Bedder, 2-12"	11.00	--	8.80	9.00	20.00	.50
Cultivator, 2 row	44.00	--	70.00	70.00	114.00	6.21
Duster	36.00	--	15.30	15.00	51.00	1.02
Vineyard trailer, 2 wheel	26.00	--	5.00	5.00	31.00	.21
Sweatboxes, 250	71.00	--	84.45	84.00	155.00	5.55[b]
Total	1,011.00			939.00	1,950.00	

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[a] Per mile.

[b] Per ton on Thompson Seedless raisins.

Total hours of use for the tractor for the typical 30-acre farm was 381.00 hours for 1955, and total tractor cost per hour use was $1.48 including $.72 overhead[1] and $.76 operating costs (Table 10).[1]

Total pickup annual use was 10,000 miles, and cost per mile of use was $.078 (Table 10).[1]

We obtained cost per hour of use of equipment by dividing total annual cost for each item of equipment by the hours of use.

Total power and equipment costs per hour and per acre were relatively high because the farm is able to use only a portion of the capacity of this equipment and fixed overhead; costs, therefore, must be distributed over a small number of productive service hours.

Annual Overhead, Operating, and Total Cost for Irrigation Water Use

Operators on the small eastside grape-cotton farms used a total of 1,008 acre-inches or 84 acre-feet of irrigation water (Table 10).

We calculated overhead costs for irrigation services using the same method as for power units and equipment (Table 11).

Operating expenses include power, lubricants, and repairs. Power expenses involve two charges: the service annual charge according to horsepower of the motor, and the cost of the kilowatt hours of electric energy consumed.

The annual average cost was $.457 per acre-inch of $5.48 per acre-foot which is considerably higher than it might have been were it not for the low consumption of water on these small farms.

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[1] The pickup truck was of .5 ton capacity and served as both the farm transport and the family car. We distributed the total annual mileage (10,000 miles) as follows: farm transport 3,500; family use 6,500 miles.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

TABLE 11

Annual Irrigation Water Use by Crops on Typical 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside, 1953-1955[a]

Crop	Acres 1	Inches per acre 2	Total 3	Pumping hours required 4
Thompson Seedless grapes (mature)	15	36	540	373.95
Thompson Seedless grapes (young)	2	36	72	49.85
Emperor grapes	5	42	210	145.40
Cotton	4	36	144	99.72
Thompson Seedless (young) grapes and cotton	1	42	42	29.08
Total	27		1,008	698.00

[a] Annual use of irrigation water was approximately the same during the period.

Cost of Operators and Hired Labor was the Largest Single Item in Total Production Costs

We present labor costs for the individual crops studied according to the labor inputs in hours at the going rates of pay (Appendix Tables 2-6). We applied these going wage rates to the tractor and pickup driver, irrigator, and contract labor inputs regardless of the source of the labor.

Operator's labor, therefore, is entered at the same rate as the employee in determining production costs by enterprises and for the entire operations.

Material costs also appear according to individual crops and for the entire farm at the going cost rates (Appendix Table 1).

We include interest on operating capital as an expense and,also, of course, the operating expenses for power equipment and irrigation water (Tables 10 and 12).

Labor Dominates Costs in Producing Both Grapes and Cotton; the Operator Provides about One Hale of all Labor.

Total cost per acre for producing Thompson Seedless raisins amounted to $271.00, of which 74.1 per cent was operating expenses. Labor and contract services jointly accounted for 70 per cent of all operating expenses (Table 13 and Appendix Table 9).

Cost per acre for Emperor grapes totalled $367.00, the highest among the crops. Of this amount, 79 per cent was operating expenses with the most important item,labor,responsible for 77 per cent of all operating expenses (Appendix Table 11).

Total cost per acre for cotton was $269.00 in 1955 with 86 per cent operating expenses. The 1955 cost per acre represented a $27.00 increase

TABLE 12

Costs and Expenses for Irrigation Equipment on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside, 1953-1955

A. Overhead

Item	Original cost	Life expected	Average investment	Annual noncash overhead costs			Taxes and insurance	All overhead
				Depreciation	Interest	Total		
	1	2	3	4	5	6	7	8
	dollars	years	dollars					
Pumping plant	1,500.00	20	768.75[a]	73.12	38.44	111.56	3.70	115.26
Well and casing	360.00	20	180.00	18.00	9.00	27.00	.87	27.87
Pipe line	1,150.00	30	575.00	38.33	28.75	67.08	2.77	69.85
Vineyard values	143.00	30	71.50	4.77	3.58	8.35	.34	8.69
Total			1,595.00	134.22		213.99	7.68	221.67

[a] Salvage value on pumping plant equals 2.5 per cent of original costs.

B. Operating and Total

Item	Total overhead	Power and lube[a]	Repairs	Total operating	Total all costs
	1	2	3	4	5
	dollars				
Irrigation plant	222.00	203.00	36.00	239.00	461.00
Cost per acre-inch	.219	--	--	.238	.457
Cost per acre-foot	2.63	--	--	2.85	5.48

[a] Demand charge $71.00; power, 8,676 K.W.L. at $.015, $130.00; lubrication $2.00.

TABLE 13

Input Costs by Crops and Total Farm, 1955 and 1953, on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside

A. 1955

Item	Thompson Seedless grapes 15 acres		Thompson Seedless grapes (young) 2 acres		Emperor grapes 5 acres	
	1 per acre	2 total	3 per acre	4 total	5 per acre	6 total
	dollars					
Overhead	70.73	1,060.95	47.53	95.06	76.12	380.60
Operating						
Power	15.14	227.10	12.77	25.54	21.57	107.85
Equipment	10.66	159.90	7.27	14.54	6.49	32.45
Materials	32.07	481.05	24.74	49.48	256.20	1,281.00
Labor	94.52	1,417.80	84.53	169.06	233.39	1,166.95
Contracts	45.46	681.90	17.73	35.46	78.75	393.75
Interest on operating capital	2.58	38.70	2.18	4.36	5.17	25.85
Total	271.16	4,067.00	197.20	394.00	678.69	3,389.00

B. 1953

Item	Thompson Seedless 15 acres		Emperor grapes 5 acres		Cotton 7 acres	
	1 per acre	2 total	3 per acre	4 total	5 per acre	6 total
	dollars					
Overhead	70.73	1,060.95	76.12	380.60	36.66	256.62
Operating						
Power	15.14	227.10	21.57	107.85	9.98	69.86
Equipment	10.66	159.90	6.49	32.45	23.17	162.19
Materials	32.07	481.05	256.20	1,281.00	28.23	197.61
Labor	94.52	1,417.80	233.39	1,166.95	39.66	277.62
Contracts	45.46	681.90	78.75	393.75	99.15	694.05
Interest on operating capital	2.58	38.70	5.17	25.85	4.77	33.39
Total	271.16	4,068.00	677.69	3,388.00	241.62	1,691.00

(Continued on next page.)

Table 13 continued.

A. 1955

Item	Cotton 4 acres		Thompson Seedless grapes (young and cotton) 1 acre		All crops total 27 acres
	7	8	9	10	11
	per acre	total	per acre	total	
	dollars				
Overhead	36.66	146.64	58.80	58.80	1,742.00
Operating					
Power	10.03	40.12	14.62	14.62	415.00
Equipment	24.06	96.24	24.54	24.54	328.00
Materials	31.43	125.72	39.23	39.23	1,977.00
Labor	39.73	158.92	93.77	93.77	3,007.00
Contracts	122.30	489.20	83.88	83.88	1,684.00
Interest on operating capital	4.85	19.40	5.16	5.16	93.00
Total	269.26	1,076.00	320.00	320.00	9,246.00

B. 1953

Item					All crops total 27 acres
					11
					dollars
Overhead					1,698.00
Operating					
Power					405.00
Equipment					354.00
Materials					1,960.00
Labor					2,862.00
Contracts					1,770.00
Interest on operating capital					98.00
Total					9,147.00

over 1953 ($242.00 per acre) but a lower cost per bale. The most important items, again, were labor and contract services which jointly amounted to 69 per cent of operating costs (Appendix Table 12).

Cost of labor was the most important single item for each of the three crops.

The farm operator performed about one half of the labor involved. Roughly, one half of the labor cost, therefore, represents a cast outlay, while the operator's share actually represents an income that the farm pays him.

Total input costs for the typical farm were $9,246.00 for 1955 as compared with $9,147.00 for 1953. Overhead costs in 1955 were 19 per cent and operating costs 81 per cent of the total (Table 13). The comparable percentages for 1953 were almost identical to those in 1955.

EMPEROR GRAPES EARNED MOST OF THE PROFITS FOR SMALL GRAPE-COTTON FARMS BOTH BEFORE AND AFTER ALLOTMENTS; THOMPSON SEEDLESS RAISINS AND COTTON HELPED PROVIDE A MARKET FOR THE OPERATOR'S LABOR--HIGHER YIELDS AND PRICES SHIFTED COTTON FROM LOSSES IN 1953 TO PROFITS IN 1955, BUT THE DROP IN EMPEROR PRICES MORE THAN OFFSET THIS GAIN

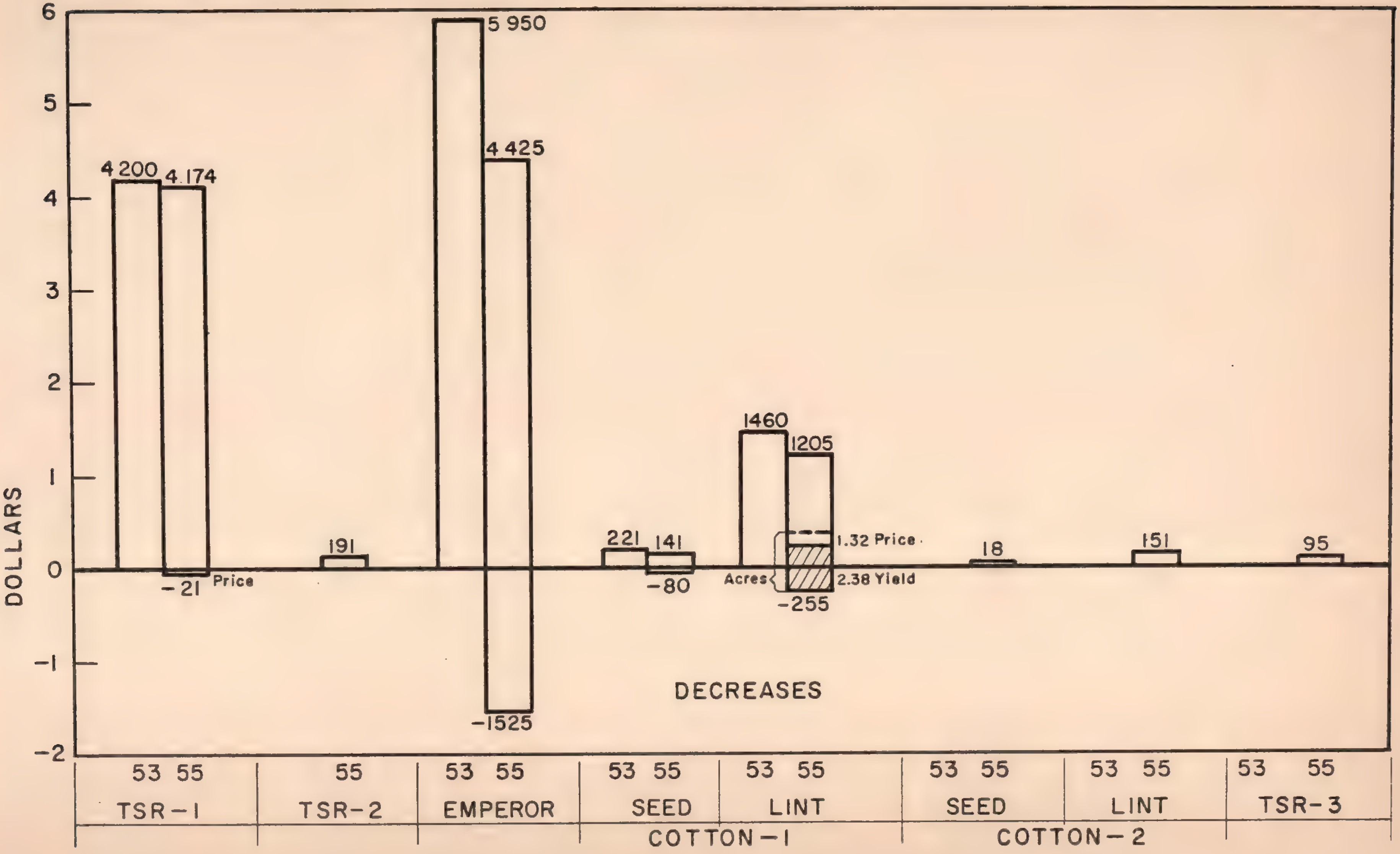
Price Declines for Emperor Grapes Cut Gross Receipts from 1953 to 1955; Emperors Still Accounted for Almost One Half of the Total in 1955

Their five acres of Emperor grapes returned operators of the small grape-cotton farms on the San Joaquin Valley eastside gross receipts of almost $6,000.00 or over one half of the farm total in 1953 (Table 14). The price drop from $2.38 per container in this year to $1.78 in 1955 (the five-year average was $1.77) cut Emperor receipts by $1,525.00. Total farm receipts dropped from nearly $12,000.00 in 1953 to about $10,400.00 in the later year (Figure III and Tables 14 and 15). Clearly, although the Emperors occupied less than 20 per cent of the total land in fruit and annual crops, they dominate the gross receipts on these farms. A combination of the yield and price gains on cotton grown alone, plus the revenue from added planting of Thompson Seedless grapes in 1955, enabled operators on this farm model to increase the gross receipts from the other crops by about $100.00 between the two seasons. This slight increase was insignificant in comparison with the $1,500.00 drop in receipts from the Emperors.

Yield and Price Gains Shifted Cotton Grown Alone from Minus to Plus Net Returns Between 1953 and 1955.

The four acres of cotton grown alone returned $269.00 above the cost of all inputs, excluding an allowance for interest on the estimated investment in the land in 1955. This return compares with the

Figure III. Changes in Gross Receipts; Grapes and Cotton on Small Grape-Cotton Farms in San Joaquin Valley Eastside, 1953-1955



The price frop for Emperor grapes was responsible for most of the decline in gross receipts between 1953 and 1955, although the reduced cotton acres also brought a small reduction.

TABLE 14

Gross Receipts, Costs, and Earnings by Crops and Total Farm on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside, 1953

Item	Thompson Seedless raisins	Emperor grapes	Cotton		Total farm
			Seed	Lint	
	1	2	3	4	5
Acres	15	5		7	27
Yield	1.75 tons	7 tons		1.4 bales	
Production	26.25 tons	35 tons	4.16 tons	9.8 bales	
Price	$ 160.00	$2.38/box (28 pounds)	$ 53.00 T	$ 148.99/bale	
			$220.48	$1,460.10	
Gross receipts	$4,200.00	$5,950.00	$1,680.58		$11,831.00
Costs (less interest on land)	4,105.95	3,388.45	1,893.15		9,388.00
Receipts minus costs	$ 94.05	$2,561.55	$ -212.57		$ 2,443.00
Land interest (per acre at 5 per cent)	333.33	111.12	155.55		600.00
Net	$ -239.28	$2,450.43	$ -368.12		$ 1,843.00

Add:	
Interest on fixed capital (includes land)	$ 1,139.00
Operator's labor	1,386.00
Net farm income	4,368.00
Less:	
Operator's labor	2,000.00
Equals:	
Return to capital and management	2,368.00[a]
Rate earned on investment (per cent)	10.97[a]
Net farm income	4,368.00
Less:	
Capital return (at 5 per cent)	1,079.00
Equals:	
Labor income	$ 3,289.00[a]

(Continued on next page.)

Table 14 continued.

a/ Obtained as follows:

Gross receipts includes the total of all sales receipts from all farm enterprises.

Subtract: *Costs* of all farm inputs, except interest on value of bare land, including imputed values for noncash items such as depreciation and unpaid family labor actually performed.

Receipts minus costs represents *gross receipts* less *costs*.

Subtract: *Land interest* calculated at 5 per cent on the estimated value of the farm land.

Net represents *receipts minus costs* less *land interest*.

Add: *Interest on fixed capital*, including land, at 5 per cent, and *operator's labor*, the value of the actual labor hours the operator worked on the various enterprises calculated at the going rate for hired labor.

Net farm income represents the *net* plus the values of *interest on fixed capital* and *operator's labor* and any other unpaid family labor actually used. This is the total farm return to pay for the operator's and any other unpaid family labor and for the use of the farm capital.

Subtract: *Operator's labor* and any other unpaid family labor imputed for the full year at the going rate that might have been earned at other alternative employment.

Return to capital and management is the amount remaining after subtracting the value of operator's and any other unpaid family labor above. This is the amount that is left to pay for the operator's management and for the use of the farm capital.

Rate earned on investment is the amount of the return to capital and management expressed as a percentage of the total farm investment.

Subtract: (From *net farm incomes*)

Capital return calculated at 5 per cent on total farm investment.

Labor income is return to operator for his labor and management.

TABLE 15

Gross Receipts, Costs, and Earnings by Crops and Total Farm on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside, 1955

Item	Thompson Seedless raisins	Thompson Seedless (2 years old)	Emperor grapes	Cotton		Cotton and Thompson Seedless (2 years old)			Total farm
				Seed	Lint	Seed	Lint	Thompson Seedless	
	1	2	3	4	5	6	7	8	9
Acres	15	2	5		4		1	1	27
Yield	1.75 tons	.6 ton	7 tons		1.8 bales		.9 bale	.6 ton	
Production	26.25 tons	1.2 tons	35 tons	3.06 tons	7.2 bales	.3825 ton	.9 bale	.6 ton	
Price	$159.00	$159.00	$1.77/box (28 pounds)	$46.00 T	$167.30/bale	$46.00	$167.30	$159.00	
				$140.76	$1,204.56	$17.60	$150.57	$95.40	
Gross receipts	$4,173.75	$190.80	$4,425.00	$1,345.32		$263.57			$10,398.00
Costs (less interest on land)	4,067.40	393.50	3,388.45	1,076.24		320.00			9,246.00
Receipts minus costs	-106.35	-202.70	1,036.55	269.08		-56.43			1,152.00
Land interest (per acre at 5 per cent)	333.33	44.44	111.12	88.88		22.23			600.00
Net	-226.98	-247.14	925.43	180.20		-78.66			552.00

Add:	
Interest on fixed capital (includes land)	$ 1,173.00
Operator's labor	1,414.00
Net farm income	3,139.00
Less:	
Operator's labor	2,000.00
Equals:	
Return to capital and management	1,139.00[a]
Rate earned on investment (per cent)	5.12[a]
Net farm income	3,139.00
Less: Capital return (at 5 per cent)	1,113.00
Equals: Labor income	$ 2,026.00[a]

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[a] See Table 14 for method of calculation.

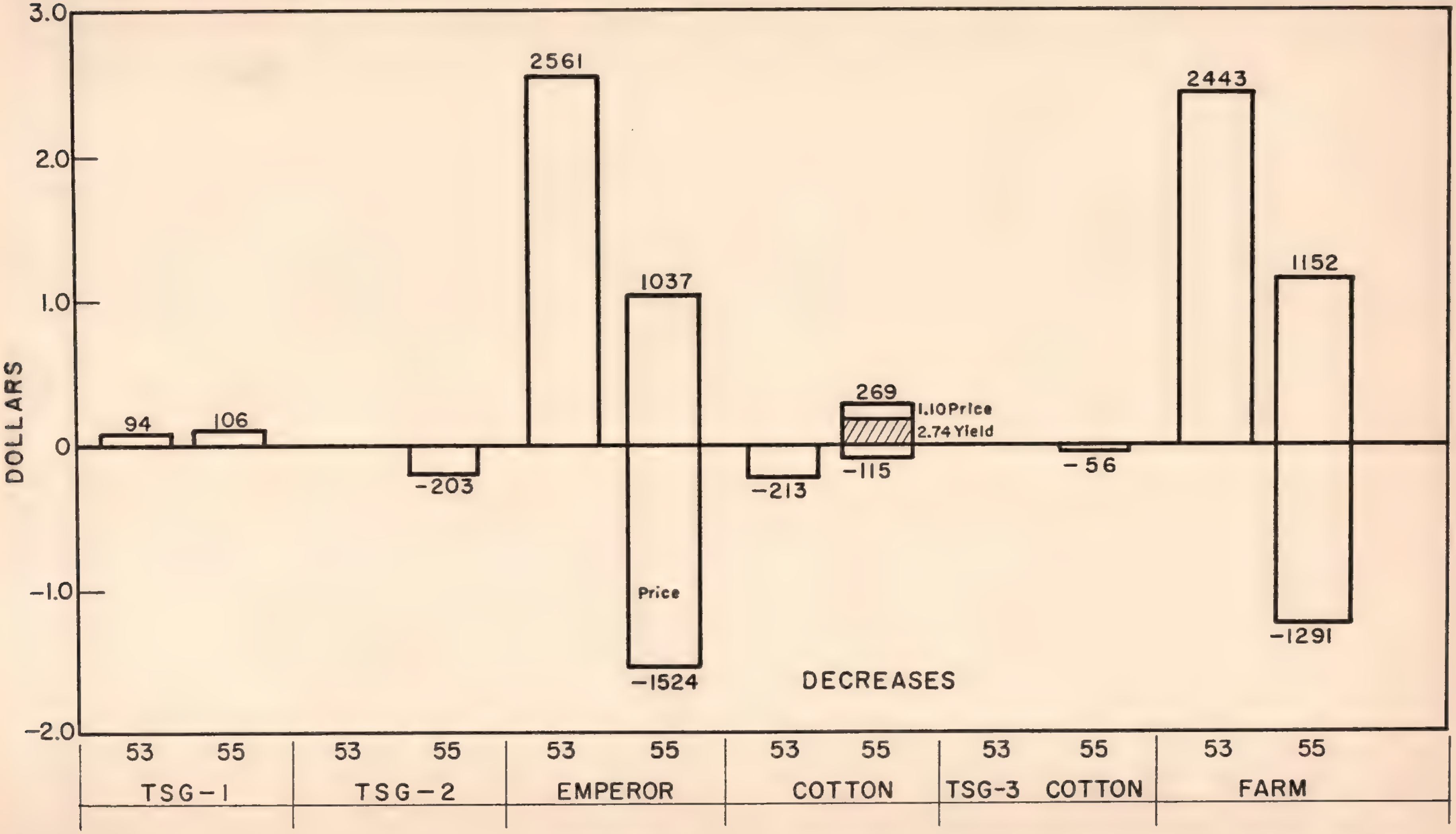
1953 returns when seven acres of cotton lacked $213.00 of covering all such costs (Tables 14 and 15). Price and yield increases largely explain this shift. Cotton lint returned $370.00 more gross receipts from the four acres in 1955 than it would have returned at 1953 yields and prices (Figure III). A drop in prices for the cottonseed offset a part of the yield gain, but the net result was $14.00 greater receipts from this product than at 1953 prices and yields. Without the net $384.00 yield and price advantage in 1955 for cotton and cottonseed produced on the four acres of cotton alone, operators on the small grape-cotton farms would have a negative return of $115.00 instead of the $269.00 on the plus side of the ledger (Figure IV).

We made no attempt to analyze the returns from the acre of cotton grown interplanted with the two-year-old Thompson Seedless grapes and to allocate the shares of returns and costs to each in 1955. It is evident that the gross receipts and net returns at $264.00 and a negative $56.00 per acre, respectively, compare unfavorably with the returns from grapes or cotton alone. Producers on the small grape-cotton farms evidently consider their best production shift alternative to be in expanding their acreages of the Thompson Seedless grapes. They must either anticipate a future shift in the relative returns from this crop as compared with the Emperors for the fresh market or they find themselves unable to surmount obstacles to expanding the Emperors profitably.

Total Farm Earnings Reflect Small Size of the Business on San Joaquin Valley Eastside Small Grape-Cotton Farms, and Failure of the Thompson Seedless Raisins to Return Profits

Receipts minus costs, ignoring interest on the investment in land, amounted to $1,152.00 in 1955 and $2,443.00 in 1953 (Tables 14 and 15).

Figure IV. Changes in Net Returns on Small Grape-Cotton Farms in The San Joaquin Valley Eastside, 1953-1955



The drop in net returns from the Emperor grapes in 1955 was partially offset by the improved cotton earnings. This cotton gain lacked $115.00 of equalling the added gross receipts resulting from the higher yields and prices.

These are small amounts remaining to pay for use of capital in land and the managerial ability of the operator, even when one considers that the cost of other capital investments and the value of the time that the operator actually spent in field work already have been deducted. As already explained, we estimated the value of the bare land at $400.00 per acre. We calculated interest on this assumed value for the land at 5 per cent and deducted this amount to find the net excess of gross receipts over the value of all inputs. We then arrived at net farm income by adding to this latter net value the charge for interest on all farm capital including the estimated value of the land and the value of the operator's actual unpaid labor. The resulting amounts, $3,139.00 in 1955 and $4,368.00 in 1953, represent the earnings of the entire farm to pay for all capital and the operator's management (Tables 14 and 15).

We estimated an imputed value of the operator's full time at $2,000.00 and subtracted this amount from the net farm incomes in 1955 and 1953 to find the return to capital and management in those years, $1,139.00 and $2,368.00, respectively. Although these returns are low in dollars, they represent 5 per cent earned on the total farm investment in 1955 and 11 per cent earnings in 1953. These measures, thus, also reflect the small size of the total farm business. Even the relatively satisfactory rate of earnings percentagewise in 1953 is associated with a decidedly small dollar amount.

This same conclusion follows when we examine the returns for the operator's labor and management after we subtract from the net farm income an allowance for interest at 5 per cent on total farm capital investment. These earnings amount to $2,026.00 in 1955 and $3,289.00 in 1953. If we are sound in imputing the value of the operator's time

as a field worker (according to alternative employment opportunities) at $2,000.00 per year, as we did in determining the earnings of capital and management above, then it is evident that this method of determining the labor and management income shows the operator with about $1,300.00 to pay for his management in 1953 and no returns at all in 1955! The total amount of capital invested in the farm business on these small grape-cotton farms is so small that the operators are really more concerned with satisfactory pay for their own time as managers and field workers than they are with their rates of profit. The labor and management incomes indicated here reflect the small size of the total farm business and the relatively unsatisfactory level of the personal earnings of the operators on these farms.

Another income measure that is important to farm operators, particularly on farms as small scale as these are, is the excess of cash receipts over cash expenses. The operators on the small grape-cotton model had net cash incomes of slightly over $4,000.00 in 1955 and $5,500.00 in 1953. Such amounts indicate that the operator would have keen competition for his limited number of dollars as between meeting family needs and maintaining his farm equipment and other farm capital goods.

SUMMARY AND CONCLUSIONS

The physical and economic context in the San Joaquin Valley eastside favors profitable grape and cotton production under intensive conditions if prices are favorable. Soils on the whole are highly productive and well adapted to producing both grapes and cotton. The climate features a long growing season, mild winters, and relatively high summer temperatures. The most serious problem in the natural resource area concerns water. The amount and timing of precipitation makes irrigation essential for profitable summer crop production. Water tends to be scarce, particularly at certain times during the summer peak use season.

Small grape-cotton farmers in the San Joaquin Valley eastside operate most of their irrigated land in grapes, and cotton is strictly a secondary crop. Cotton occupied about one fourth of the total crop acres in recent years prior to the 1954 cotton acreage allotments. Emperors for table use and Thompson Seedless for raisins utilized the rest of the tilled land. These farms are small; we analyzed a 30-acre model as typical of the model group of such operations in the San Joaquin Valley eastside.

The national cotton marketing quotas and acreage allotments in 1954 required San Joaquin Valley eastside cotton growers, as a condition for continued price support at near existing levels, to cut their acres planted to cotton. By 1955, this reduction amounted to about 45 per cent of 1953 cotton acreage for the area as a whole. The acreage allotment program provides for enforcing relatively strict compliance with cotton allotments but, up to the time this is written, no limitations or regulations on the growers' choice of other crops or uses for the acres diverted from cotton. The Soil Bank Plan, inaugurated in

1956, does offer some inducement to farmers to put portions of their cropland into uses that will not result in marketable products.

As indicated, the government continued cotton price support at relatively high levels in 1954 and 1955 under the cotton acreage allotment programs. Cotton prices rose between 1953 and 1955, though cottonseed prices declined. Prices for Emperor grapes declined and those for Thompson Seedless raisins remained steady.

The government undertook, under the cotton acreage allotment programs, to limit cotton production by regulating use of land; thus, the program focuses on land as the critical farm resource most readily controlled. These cotton programs, furthermore, concerned themselves with but one commodity, cotton being the only crop for which acreage restrictions apply. Other programs, of course, do regulate the acres in wheat, rice, and, in certain areas, corn. No attempt was made under the 1954 or 1955 cotton acreage allotment programs to limit or direct how farmers use the land that they divert from cotton or the resources other than land that they employ in producing cotton.

Farmers in the San Joaquin Valley eastside complied fully with the provisions of the cotton acreage allotment programs in 1954 and 1955. They reduced cotton acres in Tulare and other eastside counties slightly more than the amount necessary under the over-all allotments. They also attempted in every possible way to maintain their farm incomes in spite of the cut in cotton acres. First, they used both land and other resources more effectively to increase cotton yields and production and, thus, compensate for their reduced number of acres. Second, they planted the acres diverted from cotton into additional Thompson Seedless raisin vineyards hoping, thus, to maintain farm profits in later years after these grapes reach full production. They interplanted cotton in one acre of the new vineyard.

We undertook in this study to determine what changes farmers made in resource use, what related changes occurred in factors such as prices, and what earnings effects accompanied the cotton acreage allotments in 1954 and 1955 on individual farms in the San Joaquin Valley eastside. To do this, we analyzed in detail the physical and economic impact of the changes between 1953 and 1955 in the typical 30-acre grape-cotton farms.

The grape-cotton operators credit increased fertilizer inputs with most of the .4 bale cotton yield increase. Of course they also increased the inputs of labor power, machinery, and processing services that are roughly proportional to the increased yields. Improved timing also was probably important in various of the cotton cultural operations.

Emperor grape prices had much to do with the failure of the small grape-cotton growers to maintain farm profits in spite of the 1954 and 1955 cotton allotments. Rises occurred for cotton, but prices for the Emperors and cottonseed dropped sharply.

Emperors were the only profit earners on the 30-acre grape-cotton farms in 1953 and still the most important one after the cotton allotment programs. Cotton shifted from net losses in 1953 to profits in 1955 as a result of yield and price gains. The chief contribution of the Thompson Seedless raisins under 1953-1955 price conditions was to afford a market for the operator's own labor and his other farming resources. This is important, for the relatively small size of these farms makes it mandatory that the operators produce intensive crops that do use relatively heavy amounts of labor.

We analyzed the entire farm business for the grape-cotton model in order to determine the full economic impact of farm adjustments accompanying the 1954 and 1955 cotton acreage programs. The following measures

of farm earnings are useful to indicate the effects of the programs on farm earnings and to compare these effects according to farm size and organizational structure:

1. Receipts minus costs--total farm gross receipts minus all farm expenses and costs except interest on land, including imputed value of operator's labor--the actual value of hours he worked on the farm.
2. Return to capital and management (or profit)--the net return from the farm business after deducting all costs and expenses, including an imputed value for the operator's full time.
3. Rate earned on investment (or rate of profit)--return to capital and management expressed as a percentage of the average farm capital investment.
4. Labor income--return to the operator for his labor and management after deducting all other costs, including an allowance (in this instance at 5 per cent) for capital invested in farm land and equipment and for any unpaid labor other than that of the operator (in this instance, none).
5. Net cash balance--actual cash receipts less cash costs and expenses or cash outlays on the farm business.

Our most serious problem in calculating the rate of return to capital and management on profit was to find the value of farm land which we needed to determine a precise value for total farm investment. We were unable to obtain the actual value of the farm land; hence, we did not succeed in solving this problem. What we did was to use an arbitrary estimate of $400.00 per acre, bare land value. In order to arrive at market value for such land, it is necessary to add onto these estimates the values for buildings, other improvements, and irrigation facilities attached to the land. It would be purely accidental if the resulting total should approximate the actual selling price for any parcel of land in the San Joaquin Valley eastside. We suspect actually that our $400.00 estimates are well below the share of bare land in recent real estate transfers in the area. Obviously, the price of any land with vineyards established would reflect the value of such plantings in

addition to bare land values. To the extent our estimate of bare land value is low, the rates earned appearing here are deceptively high. This follows because the returns to capital and management in dollars would then be expressed as percentages of too low a total farm investment. We made such calculations, nevertheless, and use them in spite of the fact that we do not consider them precise for the reason that they are highly useful in comparing results for the two years and among enterprises. We do not recommend them as measures of absolute profit level.

The data available for this study and our analysis support the following observations regarding the 30-acre grape-cotton farms and the impact of farm adjustments accompanying the 1954 and 1955 cotton allotment programs:

1. Farmers operating the 30-acre grape-cotton farms in all size groups cushioned the impact of the cotton allotments by changing resource use and increasing cotton yields. They offset much of the physical acreage cuts by such measures and, thereby, accomplished a shift in cotton earnings to small profits during 1955 as compared with losses in 1953. They would have had losses in 1955 at 1953 yields and prices.

2. The specific changes in land use included planting additional Thompson Seedles grape vineyards, interplanting a portion of these grapes with cotton. These operators also increased inputs of fertilizer, labor, field power, and machinery and probably improved their timing in applying the latter inputs.

3. The net effects of price changes between 1953 and 1955 worked against San Joaquin Valley eastside farmers in their efforts to maintain farm profits. Prices declined for the crop that has been the best profit-maker in the past, namely, Emperor grapes. A decline in cottonseed prices was more than offset by the gain in the price for cotton lint.

4. The price rise for cotton lint was responsible for about one third of farmers' success in maintaining cotton earnings in spite of the allotments. Without this favorable situation, the growers with the water and soils problems would have had a sharper income drop than they did.

5. The dominant characteristic of the small grape-cotton farm on the San Joaquin Valley eastside is that it is too small. Farmers who depend entirely on the farm for living receive substantially lower incomes than those operating larger farms with equal efficiency or those working part time at nonfarm work in addition to operating the small grape-cotton farm.

   This is evident even at the relatively favorable 1953 price for Emperor grapes sold on the fresh market; it is still more obvious at the lower 1955 prices. All earnings measures revealed this weakness. The farm business does not fully employ the time of the operator, and the amount of capital is so small that it results in inadequate dollar earnings even when the rate of profit appears fairly satisfactory. Net cash income further illustrates this same problem. The $5,500.00 net in 1953, the most favorable year, must inevitably present difficult choices to the operator who must allocate it between family needs and farm maintenance.

6. Relatively low earnings from Thompson Seedless grapes for raisins represent a serious problem on the small grape-cotton farms. Increased yields or prices would help lessen this problem on the gross receipts side, while any effective cost-cutting measures would also help. On the other hand, if more of the grape acreage can be planted to the currently more profitable Emperors without lessening their profit-earning capacity, this measure would improve farm earnings. Considering immediate earnings alone, it would have been more profitable for the operators on the small grape-cotton farms on the San Joaquin Valley eastside to have planted their remaining acre of cotton under their 1955 allotments to cotton alone rather than to interplant it with young Thompson Seedless grapes as they did.

7. The record does not indicate that the cotton acreage allotments have acted unfavorably on 1955 earnings for the grape-cotton farms. The cotton planted alone is more profitable in 1955 than in 1953.

APPENDIX TABLES

APPENDIX TABLE 1

Typical Prices of Farm Products and Input Materials and Services on Grape-Cotton Farms in the San Joaquin Valley Eastside, 1953-1955

Item	Unit	Prices	
	1	2	3
		dollars	
		1953	1955
Farm products			
Thompson Seedless raisins	ton	160.00	159.00
Emperor grapes (end of October)	box 28 pounds	2.38	1.77[a]
Emperor grapes (January 15)[b]	box 28 pounds	2.50	2.43[a]
Cotton lint	bale 478 pounds	148.99	167.30
Cotton seed	ton	53.00	46.00
		1953-1955	
Pesticides			
Cryolite 50 per cent	cwt	12.40	
Malathion 3 per cent	cwt	14.75	
Sodium arsenite	quart	.26	
Sulfur	cwt	4.35	
5 per cent DDT--50 per cent sulfur	cwt	8.50	
Fertilizer			
Ammonium sulfate (21 per cent nitrogen)	ton	64.00	
Fuels, lubricants			
For tractor	hour	.55	
For pickup	mile	.025	
Seeds			
Barley	cwt	3.00	
Vetch	cwt	12.00	
Cotton	pound	.08	
Other materials			
Twine	pound	.24	
Paper trays	1,000	8.40	
Miscellaneous vineyard materials	acre	4.00	
Contract services			
Picking Thompson Seedless grapes	tray	.05	
Turning trays, rolling and boxing Thompson Seedless raisins	ton	4.55	
Spraying Emperor vines	gallon	.015	
Hand thinning cotton	acre	5.00	
Hand weeding cotton	acre	5.00	
Hand picking cotton	bale	42.00	
Dusting cotton	pound	.135	
Ginning cotton	bale	14.70	

(Continued on next page.)

Appendix Table 1 continued.

Item	Unit	Price
	1	2
		dollars
		1953-1955
Rental rates		
Broadcaster	hour	.25
Mower	hour	1.00
2-row stalk cutter	hour	1.00
2-row cotton planter	hour	.50
10' cultipacker	hour	.50
Fertilizing attachment	hour	.50
Cotton trailer	bale	2.22
Labor		
Tractor driver	hour	1.00
Pickup driver	hour	1.00
Irrigator	hour	.90
General	hour	.90
Compensation insurance and social security amount to 5.8 per cent of the total labor bill.		
Other		
Insuring and storing of cotton	bale	1.19
Assessed value of land	acre	100.00
Assessed value of vines (over three years old)	acre	75.00

a/ We used the five-year 1950-1954 average price as the basis for Emperor grape prices in 1955.

b/ Storage cost of Emperor grapes was about 25 cents per box for a three-month period.

APPENDIX TABLE 2

Calendar of Operations and Physical Inputs Per Acre for Producing Thompson Seedless Raisins on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside

Yield 1.75 tons

Dates	Operations	Men	Crew and equipment: Power	Crew and equipment: Equipment	Acres per 9-hour day	Physical requirements: Man-hours	Physical requirements: Tractor hours	Physical requirements: Material
	1	2	3	4	5	6	7	8
11/1-11/15	Planting cover crop	1	W-1	Broadcaster (rented)	40.0	0.23	0.23	Barley 35 pounds Vetch 15 pounds
	Discing	1	W-1	Disc harrow 5'3"	20.0	0.45	0.45	
	Pruning	1			0.33	27.00		
	Tying	1			3.00	3.00		Twine 8 pounds
	Discing 2X cover crop, brush disposal	1	W-1	Disc harrow 5'3"	20.0	0.90	0.90	
	Furrowing out	1	W-1	Bedder	30.0	0.30	0.30	
	Winter irrigating	1				5.54		8 acre-inches
	Plowing	1	W-1	Plow 2-12"	8.0	1.12	1.12	
4/25-5/5	Dusting (1st)	1	W-1	Duster	20.0	0.45	0.45	Sulfur 8 pounds
	Suckering	1			3.0	3.00		
	Furrowing out	1	W-1	Bedder	30.0	0.30	0.30	
5/10-5/20	Irrigating (1st)	1				4.85		7 acre-inches
	Cultivating	1	W-1	Spring-tooth harrow 8'	28.0	0.32	0.32	
	Dusting (2nd)	1	W-1	Duster	20.0	0.45	0.45	Sulfur 10 pounds
	Furrowing out	1	W-1	Bedder	30.0	0.30	0.30	
	Irrigating (2nd)	1				4.85		7 acre-inches
	Cultivating	1	W-1	Spring-tooth harrow 8'	28.0	0.32	0.32	
	Dusting (3rd)	1	W-1	Duster	20.0	0.45	0.45	Sulfur 10 pounds Malathion 15 pounds
	Furrowing out	1	W-1	Bedder	30.0	0.30	0.30	
	Irrigating (3rd)	1				4.85		7 acre-inches
	Cultivating	1	W-1	Spring-tooth harrow 8'	28.0	0.32	0.32	

(Continued on next page.)

Appendix Table 2 continued.

Dates	Operations	Men	Crew and equipment		Acres per 9-hour day	Man-hours	Physical requirements	
			Power	Equipment			Tractor hours	Material
	1	2	3	4	5	6	7	8
7/1-7/10	Dusting (4th)	1	W-1	Duster	20.0	0.45	0.45	Sulfur 7 pounds Malathion 15 pounds Cryolite 20 pounds
	Furrowing out	1	W-1	Bedder	30.0	0.30	0.30	
7/10-7/20	Irrigating (4th)	1				4.85		7 acre-inches
	Cultivating	1	W-1	Spring-tooth harrow 8'	28.0	0.32	0.32	
	Dragging	1	W-1	Drag	30.0	0.30	0.30	
	Distributing trays	2	W-1	Trailer	3.0	6.00	3.00	750 trays
9/1-9/15	Picking			By tray				
	Turning trays, rolling and boxing raisins			Contract				
	Hauling from vineyard	2	W-1	Trailer	4.0	4.50	2.25	
	Hauling to packer	2[a]	Pick-up					
	Collecting trays, boxes	2	W-1	Trailer	4.0	4.50	2.25	
	Total						15.08	

[a] The extra man puts in 3.88 hours per acre (20 miles round trip from field to packer).

APPENDIX TABLE 3

Calendar of Operations and Physical Inputs Per Acre for Producing Thompson Seedless Raisins (2 years old) on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside

Yield .6 ton

Dates	Operations	Men	Crew and equipment		Acres per 9-hour day	Physical requirements		
			Power	Equipment		Man-hours	Tractor hours	Material
	1	2	3	4	5	6	7	8
	Planting cover crop	1	W-1	Broadcaster (rented)	40.0	0.23	0.23	Barley 35 pounds Vetch 15 pounds
	Discing	1	W-1	Disc harrow 5'3"	20.0	0.45	0.45	
	Pruning	1			0.5	18.00		
	Disbudding and tying	1			0.5	18.00		Twine 5 pounds
	Discing 2X cover crop, brush disposal	1	W-1	Disc harrow 5'3"	20.0	0.90	0.90	
	Plowing	1	W-1	Plow 2-12"	8.0	1.12	1.12	
	Dusting (1st)	1	W-1	Duster	20.0	0.45	0.45	Sulfur 5 pounds
	Furrowing out	1	W-1	Bedder	30.0	0.30	0.30	
	Irrigating (1st)	1				4.16		6 acre-inches
	Cultivating	1	W-1	Spring-tooth harrow 8'	28.0	0.32	0.32	
	Dusting (2nd)	1	W-1	Duster	20.0	0.45	0.45	Sulfur 7 pounds
	Furrowing out	1	W-1	Bedder	30.0	0.30	0.30	
	Irrigating (2nd)	1				4.16		6 acre-inches
	Cultivating	1	W-1	Spring-tooth harrow 8'	28.0	0.32	0.32	
	Dusting (3rd)	1	W-1	Duster	20.0	0.45	0.45	Sulfur 7 pounds Malathion 10 pounds
	Furrowing out	1	W-1	Bedder	30.0	0.30	0.30	
	Irrigating (3rd)	1				0.16		6 acre-inches
	Cultivating	1	W-1	Spring-tooth harrow 8'	28.0	0.32	0.32	
	Dusting (4th)	1	W-1	Duster	20.0	0.45	0.45	Sulfur 5 pounds Malathion 10 pounds Cryolite 13 pounds

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Appendix Table 3 continued.

Dates	Operations	Men	Crew and equipment		Acres per 9-hour day	Physical requirements		
			Power	Equipment		Man-hours	Tractor hours	Material
	1	2	3	4	5	6	7	8
	Furrowing out 4-6	1	W-1	Bedder	30.0	0.90	0.90	
	Irrigating 4-6	1				12.48		18 acre-inches
	Cultivating 4-6	1	W-1	Spring-tooth harrow 8'	28.0	0.96	0.96	
	Dragging	1	W-1	Drag	30.0	0.30	0.30	
	Distributing trays	2	W-1	Trailer	4.0	4.50	2.25	300 trays
	Picking			By tray				
	Turning trays, rolling and boxing raisins			Contract				
	Hauling from vineyard	2	W-1	Trailer	8.0	2.25	1.13	
	Hauling to packer	2[a]	Pick-up					
	Collecting trays, boxes	2	W-1	Trailer	8.0	2.25	1.13	
	Total						13.03	

[a] The extra man puts in 1.3 hours per acre (20 miles round trip from field to packer).

APPENDIX TABLE 4

Calendar of Operations and Physical Inputs Per Acre for Producing Emperor Grapes on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside

Yield 7 tons

Dates	Operations	Men	Crew and equipment		Acres per 9-hour day	Physical requirements		
			Power	Equipment		Man-hours	Tractor hours	Material
	1	2	3	4	5	6	7	8
11/15-11/30	Planting cover crop	1	W-1	Broadcaster (rented)	40.0	0.23	0.23	Barley 25 pounds Vetch 15 pounds
	Discing	1	W-1	Disc harrow 5'3"	20.0	0.45	0.45	
	Pruning	1			0.36	25.00		
	Spraying			Contract				Sodium arsenite 7.5 quart
	Discing 2X cover crop, brush disposal	1	W-1	Disc harrow 5'3"	20.0	0.90	0.90	
	Furrowing out	1	W-1	Bedder	30.0	0.30	0.30	
	Winter irrigating	1				4.85		7 acre-inches
	Plowing	1	W-1	Plow 2-12"	8.0	1.12	1.12	
4/1-4/20	Dusting (1st)	1	W-1	Duster	20.0	0.45	0.45	Sulfur 10 pounds
	Suckering	1			3.0	3.00		
	Furrowing out	1	W-1	Bedder	30.0	0.30	0.30	
5/10-5/20	Irrigating (1st)	1				3.46		5 acre-inches
	Cultivating (1st)	1	W-1	Spring-tooth harrow 8'	28.0	0.32	0.32	
	Dusting 2-3	1	W-1	Duster	20.0	0.90	0.90	Sulfur 20 pounds
	Furrowing out 2-3	1	W-1	Bedder	30.0	0.60	0.60	
	Irrigating 2-3	1				6.92		10 acre-inches
	Cultivating 2-3	1	W-1	Spring-tooth harrow 8'	28.0	0.64	0.64	
	Dusting (4th)	1	W-1	Duster	20.0	0.45	0.45	Sulfur 6 pounds Malathion 15 pounds
	Furrowing out (4th)	1	W-1	Bedder	30.0	0.30	0.30	
	Irrigating (4th)	1				3.46		5 acre-inches

(Continued on next page.)

Appendix Table 4 continued.

Dates	Operations	Men	Crew and equipment		Acres per 9-hour day	Physical requirements		
			Power	Equipment		Man-hours	Tractor hours	Material
	1	2	3	4	5	6	7	8
	Cultivating (4th)	1	W-1	Spring-tooth harrow 8'	28.0	0.32	0.32	
	Dusting 5-8	1	W-1	Duster	20.0	1.80	1.80	Sulfur 32 pounds Malathion 15 pounds[a] Cryolite 40 pounds
	Furrowing 5-7	1	W-1	Flat furrow	30.0	0.90	0.90	
	Irrigating 5-7	1				10.38		15 acre-inches
9/1-9/15	Cutting weeds	1	W-1	Mower (rented)	20.0	0.45	0.45	
	Distributing field boxes	2	W-1	Trailer	8.0	2.00	1.13	
10/1-11/15	Picking	1			0.1	98.00		
	Hauling from vineyard	2	W-1	Trailer	4.0	4.50	2.25	
	Hauling to packing house	2[b]	Pick-up			4.50		
	Collecting boxes	2	W-1	Trailer	8.0	2.00	1.13	
	Total						14.94	

[a] Some years the farmers apply malathion one or more times at the rate of 15 pounds per acre and in the late summer or early fall plus one additional 20 pound application of cryolite.

[b] The extra man puts in 2.25 hours per acre (20 miles round trip from field to packer).

APPENDIX TABLE 5

Calendar of Operations and Physical Inputs Per Acre for Producing Cotton on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside

Yields: 1953, 1.4; 1955, 1.8 bales per acre

Dates	Operations	Men	Crew and equipment		Acres per 9-hour day	Physical requirements		
			Power	Equipment		Man-hours	Tractor hours	Material
	1	2	3	4	5	6	7	8
	Cutting stalks	1	W-1	2-row stalk cutter (rented)	18	0.50	0.50	
	Discing 2X	1	W-1	Disc harrow 5'3"	16	1.12	1.12	
	Plowing	1	W-1	Plow 2-12"	8	1.12	1.12	
	Furrowing out	1	W-1	Bedder	25	0.36	0.36	
	Preirrigating	1				4.16		6 acre-inches
	Discing 2X	1	W-1	Disc harrow and spring tooth	14	1.28	1.28	
4/5-4/20	Planting	2	W-1	2-row planter (rented)	16	1.12	0.56	30 pounds seed
	Cultipacking	1	W-1	10' cultipacker (rented)	33	0.27	0.27	
	Cultivating	1	W-1	2-row cultivator	10	0.90	0.90	
	Hand thin			Contract				
	Cultivating	1	W-1	2-row cultivator	12	0.75	0.75	
	Fertilizing	1	W-1	Attachment (rented)	12	0.75	0.75	1955-475 } #$NH_4{}_2$ 1953-380 } SO_4
	Cultivating	1	W-1	2-row cultivator	12	0.75	0.75	
6/15-7/1	Irrigating (1st)	1				4.16		6 acre-inches
	Hand weed			Contract				
	Cultivating	1	W-1	2-row cultivator	14	0.64	0.64	
	Irrigating (2nd)	1				4.16		6 acre-inches
6/15-8/15	Dusting 1-2			Contract				60 pounds of 5 per cent DDT and 50 per cent sulfur
	Cultivating	1	W-1	2-row cultivator	14	0.64	0.64	
7/20-9/5	Irrigating 3-5	1				12.48		18 acre-inches
9/15-on	Picking (1st) (hand)			Contract				
11/15-on	Picking (2nd) (hand)			Contract				
	Hauling to gin	1	Pick-up	Cotton trailer (rented)				
	Ginning			Contract				
	Total						9.64	

APPENDIX TABLE 6

Calendar of Operations and Physical Inputs Per Acre for Producing Thompson Seedless Raisins (2 years old) Interplanted with Cotton on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside

Yields: raisins .6 ton; cotton .9 bale

Dates	Operations	Men	Crew and equipment		Acres per 9-hour day	Physical requirements		
			Power	Equipment		Man-hours	Tractor hours	Material
	1	2	3	4	5	6	7	8
	Cutting cotton stalks	1	W-1	2-row stalk cutter (rented)	18.0	0.50	0.50	
	Discing 2X	1	W-1	Disc harrow 5'3"	20.0	0.90	0.90	
	Pruning (Thompson Seedless grapes)	1			0.5	18.00		
	Plowing	1	W-1	Plow 2-12"	9.0	1.12	1.12	
	Furrowing out	1	W-1	Bedder	30.0	0.30	0.30	
	Preirrigating	1				4.16		6 acre-inches
	Discing 2X	1	W-1	Disc harrow and spring-tooth harrow	20.0	0.90	0.90	
	Planting cotton	2	W-1	2-row planter (rented)	16.0	1.12	0.56	15 pounds seed
	Cultipacking	1	W-1	10' cultipacker (rented)	33.0	0.27	0.27	
	Disbudding and tying (Thompson Seedless grapes)	1			0.5	18.00		5 pounds twine
	Irrigating 6X	1				24.96		36 acre-inches
	Cultivating 4X	1	W-1	2-row cultivator	10.0	3.60	3.60	
	Cultivating and layby	1	W-1	2-row cultivator	14.0	0.64	0.64	
	Hand thinning, hand weeding cotton			Contract				
	Fertilizing	1	W-1	Attachment (rented)	12.0	0.75	0.75	1955-475 } #$NH_4{}_2$ 1953-380 } SO_4
	Dusting Thompson Seedless grapes 4X	1	W-1	Duster	20.0	1.80	1.80	Sulfur 24 pounds Malathion 20 pounds Cryolite 13 pounds

(Continued on next page.)

Appendix Table 6 continued.

Dates	Operations	Men	Crew and equipment		Acres per 9-hour day	Physical requirements		
			Power	Equipment		Man-hours	Tractor hours	Material
	1	2	3	4	5	6	7	8
	Dusting cotton 2X			Contract				5 per cent DDT 50 per cent sulfur 30 pounds
	Distributing Thompson Seedless grape trays	2	W-1	Trailer	4.0	4.50	2.25	300 trays
	Picking Thompson Seedless grapes			By tray				
	Turning trays, rolling, and boxing raisins			Contract				
	Hauling Thompson Seedless raisins from vineyards	2	W-1	Trailer	8.0	2.25	1.13	
	Hauling Thompson Seedless raisins to packer	2[a]	Pick-up					
	Collecting Thompson Seedless grape trays, boxes	2	W-1	Trailer	8.0	2.25	1.13	
	Picking cotton by hand			Contract				
	Hauling cotton to gin	1	Pick-up	Cotton trailer (rented)				
	Ginning			Contract				
	Total						15.29	

[a] The extra man puts 2.14 hours per acre (20 miles round trip).

APPENDIX TABLE 7

Power Units and Equipment Use on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside, 1953-1955

Item	Thompson Seedless raisins		Thompson Seedless raisins (2 years old)		Emperor grapes		Cotton		Thompson Seedless raisins and cotton		All crops total hours
	1	2	3	4	5	6	7	8	9	10	11
	per acre	total	per acre	total	per acre	total	per acre	total	per acre	total	
	15 acres		2 acres		5 acres		4 acres		1 acre		
Tractor 20-25 HP	15.08	226.20	13.03	26.06	14.94	74.70	9.64	38.56	15.29	15.29	380.81
Truck pickup 1/2 ton	105	1,575	82	164	292	1,460	77.2	308.8	85.6	85.6	3,593.4[a]
Plow 2-12"	1.12	16.80	1.12	2.24	1.12	5.60	1.12	4.48	1.12	1.12	30.24
Disc harrow 5'3"	1.35	20.25	1.35	2.70	1.35	6.75	1.76	7.04	1.80	1.80	38.54
Spring-tooth harrow 8'	1.28	19.20	1.92	3.84	1.28	6.40	1.28	5.12	.90	.90	35.46
Drag	.30	4.50	.30	.60	--	--	--	--	--	--	5.10
Bedder 2-12"	1.50	22.50	1.80	3.60	2.40	12.00	.36	1.44	.30	.30	39.84
Cultivator 2 row	--	--	--	--	--	--	3.68	14.72	3.68	3.68	18.40
Duster	1.80	27.00	1.80	3.60	3.60	18.00	--	--	1.80	1.80	50.40
Vineyard trailer 2 wheel	7.50	112.50	4.50	9.00	4.50	22.50	--	--	4.50	4.50	148.50

[a] Miles charged against the farm business. Power units and equipment use for 1953 was approximately the same.

APPENDIX TABLE 8

Inputs and Costs for Producing Thompson Seedless Raisins on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside

Yield 1.75 tons

Item	Unit	Unit cost 1955	Unit cost 1953	Units used per acre	Cost per acre 1955	Cost per acre 1953	Total cost 1955	Total cost 1953
	1	2	3	4	5	6	7	8
							15 acres	acres
Overhead								
Taxes on real estate and vines					11.38		170.70	
Improvements					1.54		23.10	
Depreciation (vines-stakes-trellis)					13.33		199.95	
Interest (vines-stakes-trellis)					10.00		150.00	
Power					14.85		222.75	
Equipment					11.75		176.25	
Irrigation water					7.88		118.20	
Total overhead					70.73		1,060.95	
Operating								
Power W-1	hour	.76		15.08	11.46		171.90	
Pickup 1/2 ton	mile	.035		105	3.68		55.20	
Equipment								
2-12" plow	hour	2.21		1.12	2.48		37.20	
5'3" disc harrow	hour	1.16		1.35	1.57		23.55	
8' spring-tooth harrow	hour	.14		1.28	.18		2.70	
Drag	hour			.30				
Bedder	hour	.22		1.50	.33		4.95	
Duster	hour	.30		1.80	.54		8.10	
2-wheel vineyard trailer	hour	.03		7.50	.23		3.45	
Sweatboxes	ton	3.01		1.75	5.27		79.05	
Broadcaster (rented)	hour	.25		.23	.06		.90	
Materials								
Seed { Barley (cover crop)	pound	.03		35	1.05		15.75	
Vetch	pound	.12		15	1.80		27.00	
Sulfur	cwt	4.35		.35	1.52		22.80	
Malathion 3 per cent	cwt	14.75		.30	4.43		66.45	
Cryolite 50 per cent	cwt	12.40		.20	2.48		37.20	
Twine	pound	.24		8	1.92		28.80	
Paper trays	tray	.0084		750	6.30		94.50	
Irrigation water	acre"	.238		36	8.57		128.55	
Miscellaneous: replants, stakes, etc.					4.00		60.00	

(Continued on next page.)

Appendix Table 8 continued.

Item	Unit	Unit cost		Units used per acre	Cost per acre		Total cost	
		1955	1953		1955	1953	1955	1953
	1	2	3	4	5	6	7	8
							15 acres	acres
Labor								
Drivers	hour	1.00		20.71	20.71		310.65	
Irrigators	hour	.90		31.88	28.69		430.35	
General	hour	.90		44.38	39.94		599.10	
Social security and compensation insurance	$100	5.80			5.18		77.70	
Contracts								
Picking	tray	.05		750	37.50		562.50	
Turning, rolling, boxing raisins	ton	4.55		1.75	7.96		119.40	
Interest on operating capital					2.58		38.70	
Total operating					200.43		3,006.45	
Total cost					271.16		4,067.40	

APPENDIX TABLE 9

Inputs and Costs for Producing Thompson Seedless Raisins (2 years old) on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside

Yield .6 ton

Item	Unit	Unit cost		Units used per acre	Cost per acre		Total cost	
		1955	1953		1955	1953	1955	1953
	1	2	3	4	5	6	7	8
							2 acres	acres
Overhead								
Real estate taxes					6.50		13.00	
Improvements					.77		1.54	
Interest (vines-stakes-trellis)					11.25		22.50	
Power					12.50		25.00	
Equipment					8.63		17.26	
Irrigation water					7.88		15.76	
Total overhead					47.53		95.06	
Operating								
Power W-1	hour	.76		13.03	9.90		19.80	
Pickup .5 T	mile	.035		82	2.87		5.74	
Equipment								
2-12" plow	hour	2.21		1.12	2.48		4.96	
5'3" disc harrow	hour	1.16		1.35	1.57		3.14	
8' spring-tooth harrow	hour	.14		1.92	.27		.54	
Drag	hour			.30				
2-12" bedder	hour	.22		1.80	.40		.80	
Duster	hour	.30		1.80	.54		1.08	
2-wheel vineyard trailer	hour	.03		4.50	.14		.28	
Sweatboxes	ton	3.01		.6	1.81		3.62	
Broadcaster (rented)	hour	.25		.23	.06		.12	
Materials								
Barley (cover crop)	pound	.03		35	1.05		2.10	
Seed Vetch	pound	.12		15	1.80		3.60	
Sulfur	cwt	4.35		.24	1.04		2.08	
Malathion 3 per cent	cwt	14.75		.20	2.95		5.90	
Cryolite 50 per cent	cwt	12.40		.13	1.61		3.22	
Twine	pound	.24		5	1.20		2.40	
Paper trays	tray	.0084		300	2.52		5.04	
Irrigation water	acre"	.238		36	8.57		17.14	
Miscellaneous: replants, stakes, etc.					4.00		8.00	

(Continued on next page.)

Appendix Table 9 continued.

Item	Unit	Unit cost		Units used per acre	Cost per acre		Total cost	
		1955	1953		1955	1953	1955	1953
	1	2	3	4	5	6	7	8
							2 acres	acres
Labor								
Drivers	hour	1.00		16.08	16.08		32.16	
Irrigators	hour	.90		29.10	26.19		52.38	
General	hour	.90		41.81	37.63		75.26	
Social security and compensation insurance					4.63		9.26	
Contracts								
Picking	tray	.05		300	15.00		30.00	
Turning, rolling, boxing raisins	ton	4.55		.6	2.73		5.46	
Interest on operating capital					2.18		4.36	
Total operating					149.22		298.44	
Total cost					196.75		393.50	

APPENDIX TABLE 10

Inputs and Costs for Producing Emperor Grapes on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside

Yield 7 tons

Item	Unit	Unit cost		Units used per acre	Cost per acre		Total cost	
		1955	1953		1955	1953	1955	1953
	1	2	3	4	5	6	7	8
							5 acres	acres
Overhead								
Taxes on real estate and vines					11.38		56.90	
Improvements					.77		3.85	
Depreciation (vines-stakes-trellis)					13.33		66.65	
Interest (vines-stakes-trellis)					10.00		50.00	
Power					21.86		109.30	
Equipment					8.03		40.15	
Irrigation water					10.75		53.75	
Total overhead					76.12		380.60	
Operating								
Power W-1	hour	.76		14.94	11.35		56.75	
Pickup .5 T	mile	.035		292	10.22		51.10	
Equipment								
2-12" plow	hour	2.21		1.12	2.48		12.40	
5'3" disc harrow	hour	1.16		1.35	1.57		7.85	
8' spring-tooth harrow	hour	.14		1.28	.18		.90	
2-12" bedder	hour	.22		2.40	.53		2.65	
Duster	hour	.30		3.60	1.08		5.40	
2-wheel vineyard trailer	hour	.03		4.50	.14		.70	
Mower (rented)	hour	1.00		.45	.45		2.25	
Broadcaster (rented)	hour	.25		.23	.06		.30	
Materials								
Seed { Barley (cover crop)	pound	.03		35	1.05		5.25	
Seed { Vetch	pound	.12		15	1.80		9.00	
Seed { Sulfur	cwt	4.35		.68	2.96		14.80	
Malathion 3 per cent	cwt	14.75		.30	4.43		22.15	
Cryolite 50 per cent	cwt	12.40		.40	4.96		24.80	
Sodium arsenite	quart	.26		7.50	2.00		10.00	
Irrigation water	acre"	.238		42	10.00		50.00	
Miscellaneous: replants, stakes, etc.					4.00		20.00	
Containers, liners	crate	.45		500	225.00		1,125.00	

(Continued on next page.)

Appendix Table 10 continued.

Item	Unit	Unit cost 1955	Unit cost 1953	Units used per acre	Cost per acre 1955	Cost per acre 1953	Total cost 1955	Total cost 1953
	1	2	3	4	5	6	7	8
							5 acres	acres
Labor								
Drivers	hour	1.00		40.24	40.24		201.20	
Irrigators	hour	.90		43.33	39.00		195.00	
General	hour	.90		46.06	41.45		207.25	
Harvesting, hauling	hour	.90		111	99.90		499.50	
Social security and compensation insurance	$100	5.80			12.80		64.00	
Contracts								
Spraying	gallon	.015		250	3.75		18.75	
Packing	crate	.15		500	75.00		375.00	
Interest on operating capital					5.17		25.85	
Total operating					601.57		3,007.85	
Total cost					677.69		3,388.45	

APPENDIX TABLE 11

Inputs and Costs for Producing Cotton on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside

Yields: 1953, 1.4 bales; 1955, 1.8 bales

Item	Unit	Unit cost	Units used per acre		Cost per acre		Total cost	
			1955	1953	1955	1953	1955	1953
	1	2	3	4	5	6	7	8
							4 acres	7 acres
Overhead								
Real estate taxes					6.50	6.50	26.00	45.50
Improvements					.77	.77	3.08	5.39
Power					9.87	9.87	39.48	69.09
Equipment					13.33	13.33	53.32	93.31
Irrigation water					6.19	6.19	24.76	43.33
Total overhead					36.66	36.66	146.64	256.62
Operating								
Power W-1	hour	.76	9.64	9.64	7.33	7.33	29.32	51.31
Pickup .5 T	mile	.035	77.2	75.6	2.70	2.65	10.80	18.55
Equipment								
2-12" plow	hour	2.21	1.12	1.12	2.48	2.48	9.92	17.36
5'3" disc harrow	hour	1.16	1.76	1.76	2.04	2.04	8.16	14.28
8' spring-tooth harrow	hour	.14	1.28	1.28	.18	.18	.72	1.26
2-row cultivator	hour	3.80	3.68	3.68	13.98	13.98	55.92	97.86
2-12" bedder	hour	3.22	.36	.36	.08	.08	.32	.56
Rented equipment								
2-row stalk cutter	hour	1.00	.50	.50	.50	.50	2.00	3.50
2-row planter	hour	.50	.56	.56	.28	.28	1.12	1.96
10' cultipacker	hour	.50	.27	.27	.14	.14	.56	.98
Fertilizer attachment	hour	.50	.75	.75	.38	.38	1.52	2.66
Cotton trailer	bale	2.22	1.8	1.4	4.00	3.11	16.00	21.77
Materials								
Seed	pound	.08	30	30	2.40	2.40	9.60	16.80
Ammonium sulfate	T	64.00	.24	.19	15.36	12.16	61.44	85.12
5 per cent DDT and 50 per cent sulfur	cwt	8.50	.6	.6	5.10	5.10	20.40	35.70
Irrigation water	acre"	.238	36	36	8.57	8.57	34.28	59.99
Labor								
Drivers	hour	1.00	13.07	13.00	13.07	13.00	52.28	91.00
Irrigators	hour	.90	24.96	24.96	22.46	22.46	89.84	157.22
General	hour	.90	2.24	2.24	2.02	2.02	8.08	14.14
Social security and compensation insurance	$100	5.80			2.18	2.18	8.72	15.26

(Continued on next page.)

Appendix Table 11 continued.

Item	Unit	Unit cost	Units used per acre		Cost per acre		Total cost	
			1955	1953	1955	1953	1955	1953
	1	2	3	4	5	6	7	8
							4 acres	7 acres
Contracts								
Hand thinning	acre	5.00	1	1	5.00	5.00	20.00	35.00
Hand weeding	acre	5.00	1	1	5.00	5.00	20.00	35.00
Dusting	pound	.135	60	60	8.10	8.10	32.40	56.70
Hand picking	bale	42.00	1.8	1.4	75.60	58.80	302.40	411.60
Ginning	bale	14.70	1.8	1.4	26.46	20.58	105.84	144.06
Insurance and storage		1.19	1.8	1.4	2.14	1.67	8.56	11.69
Interest on operating capital					4.85	4.77	19.40	33.39
Total operating					232.40	204.96	929.60	1,434.72
Total cost					269.06	241.62	1,076.24	1,691.34

APPENDIX TABLE 12

Inputs and Costs for Producing Cotton in Combination with Thompson Seedless Raisins (2 yearsold) on 30-Acre Grape-Cotton Farms in the San Joaquin Valley Eastside

Yields: grapes .06 ton; cotton .9 bale

Item	Unit	Unit cost		Units used per acre	Cost per acre		Total cost	
		1955	1953		1955	1953	1955	1953
	1	2	3	4	5	6	7	8
							1 acre	acre
Overhead								
Real estate taxes					6.50		6.50	
Improvements					.77		.77	
Interest (vines-stakes-trellis)					11.25		11.25	
Power					14.26		14.26	
Equipment					16.82		16.82	
Irrigation water					9.20		9.20	
Total overhead					58.80		58.80	
Operating								
Power W-1	hour	.76		15.29	11.62		11.62	
Pickup .5 T	mile	.035		85.6	3.00		3.00	
Equipment								
2-12" plow	hour	2.21		1.12	2.48		2.48	
5'3" disc harrow	hour	1.16		1.80	2.09		2.09	
8' spring-tooth harrow	hour	.14		.90	.13		.13	
2-12" bedder	hour	.22		.30	.07		.07	
2-row cultivator	hour	3.80		3.68	13.98		13.98	
Duster	hour	.30		1.80	.54		.54	
2-wheel vineyard trailer	hour	.03		4.50	.14		.14	
Sweatboxes	ton	3.01		.6	1.81		1.81	
Rented equipment								
2-row stalk cutter	hour	1.00		.50	.50		.50	
2-row cotton planter	hour	.50		.56	.28		.28	
10' cultipacker	hour	.50		.27	.14		.14	
Fertilizer attachment	hour	.50		.75	.38		.38	
Cotton trailer	bale	2.22		.9	2.00		2.00	
Materials								
Cotton seed	pound	.08		.15	1.20		1.20	
Ammonium sulfate	cwt	64.00		.19	12.16		12.16	
5 per cent DDT and 50 per cent sulfur	cwt	8.50		.30	2.55		2.55	

(Continued on next page.)

Appendix Table 12 continued.

Item	Unit	Unit cost		Units used per acre	Cost per acre		Total cost	
		1955	1953		1955	1953	1955	1953
	1	2	3	4	5	6	7	8
							1 acre	acre
Sulfur	cwt	4.35		.24	1.04		1.04	
Malathion 3 per cent	cwt	14.75		.20	2.95		2.95	
Cryolite 50 per cent	cwt	12.40		.13	1.61		1.61	
Twine	pound	.24		5	1.20		1.20	
Paper trays	tray	.0084		300	2.52		2.52	
Irrigation water	acre"	.238		42	10.00		10.00	
Miscellaneous: replants, stakes, etc.					4.00		4.00	
Labor								
Drivers	hour	1.00		19.18	19.18		19.18	
Irrigators	hour	.90		33.95	30.56		30.56	
General	hour	.90		43.21	38.89		38.89	
Social security and compensation insurance	$100	5.80			5.14		5.14	
Contracts								
Hand thinning cotton	acre	5.00		1	5.00		5.00	
Hand weeding cotton	acre	5.00		1	5.00		5.00	
Dusting cotton	pound	.135		30	4.05		4.05	
Hand picking cotton	bale	42.00		.9	37.80		37.80	
Ginning cotton	bale	14.70		.9	13.23		13.23	
Picking Thompson Seedless raisins	tray	.05		300	15.00		15.00	
Turning, rolling, and boxing raisins	ton	4.55		.6	2.73		2.73	
Insuring, storing cotton		1.19		.9	1.07		1.07	
Interest on operating capital					5.16		5.16	
Total operating					261.20		261.20	
Total cost					320.00		320.00	

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UNIVERSITY OF CALIFORNIA

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California Agricultural Experiment Station, Giannini Foundation of
Agricultural Economics, in Cooperation with Farm Economics Research
Division, Agricultural Research Service, U. S. Department of Agriculture

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FARM ADJUSTMENTS AND EARNINGS UNDER 1955 COTTON ACREAGE ALLOTMENTS

3. San Joaquin Valley Eastside Cotton Farms, 1953-1955

HERE ARE THE HIGHLIGHTS OF THE FINDINGS:

WATER tables are dropping, and costs are rising in the San Joaquin Valley Eastside; about one-third the land is highly productive, two-thirds of Grade 3 or better -

See pages 8-11

SHORT-RUN ADJUSTMENTS, largely planting diverted acres in alfalfa or feed grains,dominated the allotment picture from 1953-1955 -

See pages 12-16

SMALL FARMS were most numerous, but large ones had the bulk of the cropland; all but the smallest had to cut cotton acres -

See pages 17-26

BETTER COTTON YIELDS, reflecting improved management but higher inputs and costs, were typical -

See page 27

LOSSES DROPPED slightly between 1953 and 1955 on the 80-acre farm, but it still was too small to show the earnings of the larger farms -

HIGHER COTTON AND ALFALFA PRICES and cotton yields explain the better 1955 showing -

See pages 28-51

PROFIT GAINS for 160-acre farm reflect almost no change in gross receipts with a drop in variable expenses -

COTTON AND ALFALFA prices and cotton yields offset the cut in cotton acres -

See pages 52-70

PROFITS DROPPED for the two 320-acre farm models under cotton allotments and management adjustments between 1953 and 1955 -

CORN AND BARLEY both showed losses, while the improved cotton and alfalfa returns per acre were not enough to offset the drop in cotton acres -

See pages 71-97

HIGHER YIELDS WITH MINIMUM COST INCREASES have proved the most effective farmer-originated means of cushioning the impact of cotton acre cuts and allotments -

PRICE RISES were very helpful in reinforcing farmer action -

SHORT-TERM ADJUSTMENTS may give way to longer term changes in production organization and capital investments if allotments continue -

See pages 98-104

FARM ADJUSTMENTS AND EARNINGS UNDER THE COTTON ACREAGE [illegible]

3. San Joaquin Valley Eastside Cotton Farms, [illegible]

[illegible]

[illegible] are grouped [illegible] costs [illegible] in the San Joaquin Valley [illegible] 4.2 or [illegible]

See pages 8-11

[illegible] acreage [illegible] farms, [illegible] 1953-1955.

See pages 12-16

Small farms were most numerous but larger units had the bulk of the cropland [illegible] the small [illegible] cotton [illegible]

See pages 17-22

HIGHER COTTON YIELDS [illegible] improved management but higher inputs and [illegible]

[illegible]

LARGER [illegible] slightly between 1953 and [illegible] on the [illegible] farm, but it still was too small to [illegible] at the larger farms.

[illegible] and cotton yields [illegible] the [illegible]

See pages 28-31

[illegible] in [illegible]

COTTON AND [illegible] and cotton yields [illegible] the [illegible]

[illegible]

[illegible]

[illegible] both [illegible], while the improved [illegible] and [illegible] per acre were [illegible] the [illegible] in [illegible]

[illegible]

[illegible] of [illegible] of cotton [illegible] and [illegible]

[illegible]

[illegible]

See pages [illegible]

FARM ADJUSTMENTS AND EARNINGS UNDER 1955 COTTON ACREAGE ALLOTMENTS

3. San Joaquin Valley Eastside Cotton Farms, 1953-1955 [1]

Douglas D. Caton [2]
Trimble R. Hedges [3]
W. Neill Schaller [2]

ACREAGE ALLOTMENTS BRING PROBLEMS IN USING RESOURCES AND THESE REACT ON FARM EARNINGS

The Allotments Tended to Idle Resources or Lessen Their Use

The Secretary of Agriculture reintroduced cotton acreage allotments in 1954, and reduced them further in 1955. These actions required cotton producers to cut down cotton and find new crops. [4] These adjustments have affected

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[1] This report is the third of a series based on detailed investigations of the changes in farm organization, production, and earnings under the cotton acreage allotments beginning in 1954. This research comes under California Agricultural Experiment Station Project Number 1641 and is partially supported under Line Project PE e3-5(w), Farm Economics Research Division, Western Field Research Section, U. S. Department of Agriculture. The order of listing for the authors does not imply seniority of authorship.

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[4] Cotton acreage allotments and marketing quotas originated with the Agricultural Adjustment Act of 1938 and are governed today by this statute, its amendments, and a body of related laws passed since 1938. When quotas are deemed necessary by the Secretary of Agriculture due to a surplus over needs, they must be approved by a vote of two-thirds of the nation's cotton producers. If the quota is not approved, the price support for the crop is reduced to about 50 percent of parity. See Commodity Stabilization Service, U. S. Department of Agriculture, Compilation of Statutes Relating to Soil Conservation, Marketing Quotas and Allotments, Crop Insurance, Sugar Payments and Quotas, Price Support, Commodity Credit Corporation, and Related Statutes--as of January 1, 1955, Agricultural Handbook No. 79, pp. 47-58.

resource use and net income. We assume that the farmer's objective is to maximize his net farm income over time; therefore, two questions demand answers: (1) What has been the actual effect of reduced cotton acreage and (2) What is the optimum adjustment which can be made. This study will concentrate on the first question.

Allotments for upland cotton were in effect from 1938 to 1942, national allotments averaging slightly over 27 million acres per year. In 1950 acreage restrictions were again effective for one year, with a national allotment of 21 million acres. A surplus of cotton in 1952 and again in 1953 brought production controls back into effect. Farmers approved marketing quotas in December, 1953, and the Secretary of Agriculture established a national allotment of 21,379,000 acres for 1954. Marketing and acreage restrictions on cotton have been in effect continuously since 1954. The national allotment was 18,113,000 acres in 1955 and 17,391,000 acres in 1956. 1/

Anything which has an effect on cotton acreage, yield, or price in California has a significant economic impact. Table 1 illustrates the economic importance of cotton in 1953 and indicates the change in this importance which accompanied acreage restrictions in 1954 and 1955.

We Undertook to Analyze and Evaluate the Problem

The objective of this study is to determine and to compare the net farm income on California cotton-producing farms under pre-allotment and post-allotment conditions. The relationships we examined are those associated with the physical and economic adjustments which farmers made.

1/ Commodity Stabilization Service, U. S. Department of Agriculture, Acreage Allotment and Marketing Quota Summary, September, 1955.

TABLE 1

California Cotton Acreage, Yields, Prices, and Total Value, 1953-1955

Cotton	Units	1953	1954	1955
	1	2	3	4
Acres harvested	1,000 acres	1,340	883	745
Lint yield per acre	pounds	632	806	774
Total lint production	1,000 bales	1,768	1,487	1,205
Price per pound	dollars	.3117	.3332	.3308
Total lint value	1,000 dollars	275,488	247,677	199,322
Seed yield per acre	pounds	1,076	1,402	1,329
Total seed production	1,000 tons	721	619	495
Price per ton	dollars	53.10	59.20	46.10
Total seed value	1,000 dollars	38,287	36,645	22,820
Total value, lint and cotton	1,000 dollars	313,775	284,322	222,142
Total value, all crops from farm marketings	1,000 dollars	1,662,660	1,613,574	1,681,277
Value of cotton as percent of value of all crops	percent	18.9	17.6	13.2
Total value all commodities from farm marketings	1,000 dollars	2,633,910	2,518,384	2,632,650
Value of cotton as percent of value of all commodities	percent	11.9	11.3	8.4

Source: (1) Value, all crops; and Value, all commodities, Farm Income Situation, U. S. Agricultural Marketing Service. (2) All other data, California Crop and Livestock Reporting Service.

The Analysis Employs Data from Farmers, Farm Suppliers, and Government Agencies

The San Joaquin Valley is the largest cotton-producing area in California. We have limited this portion of the study, however, to one subarea of the Valley, "Eastside." It includes all of Tulare County and the eastern portions of Fresno and Kings Counties (Figure 1). [1] The location of cotton gins in Figure 1 defines the area of concentration of cotton farms within the subarea.

An introductory section will consider, briefly, the problem of determining optimum adjustments on the Eastside. This section will describe the natural resources of the subarea and point out possible opportunities and limitations affecting optimum adjustments. An analysis of actual adjustments on "model" farms, which follows the introductory section, will constitute the major part of this study.

We developed four "model" farm organizations or "typical" cotton-producing units to facilitate analysis of allotment effects and adjustments. These are as follows: [2]

Number of Models	Type of Organization	Acres
1	Cotton-alfalfa	80
1	Cotton-alfalfa	160
2	Cotton-alfalfa	320

Our first step in defining the "model" farms was to identify the climate, land, and irrigation water resources. Records of the U. S. Weather Bureau and

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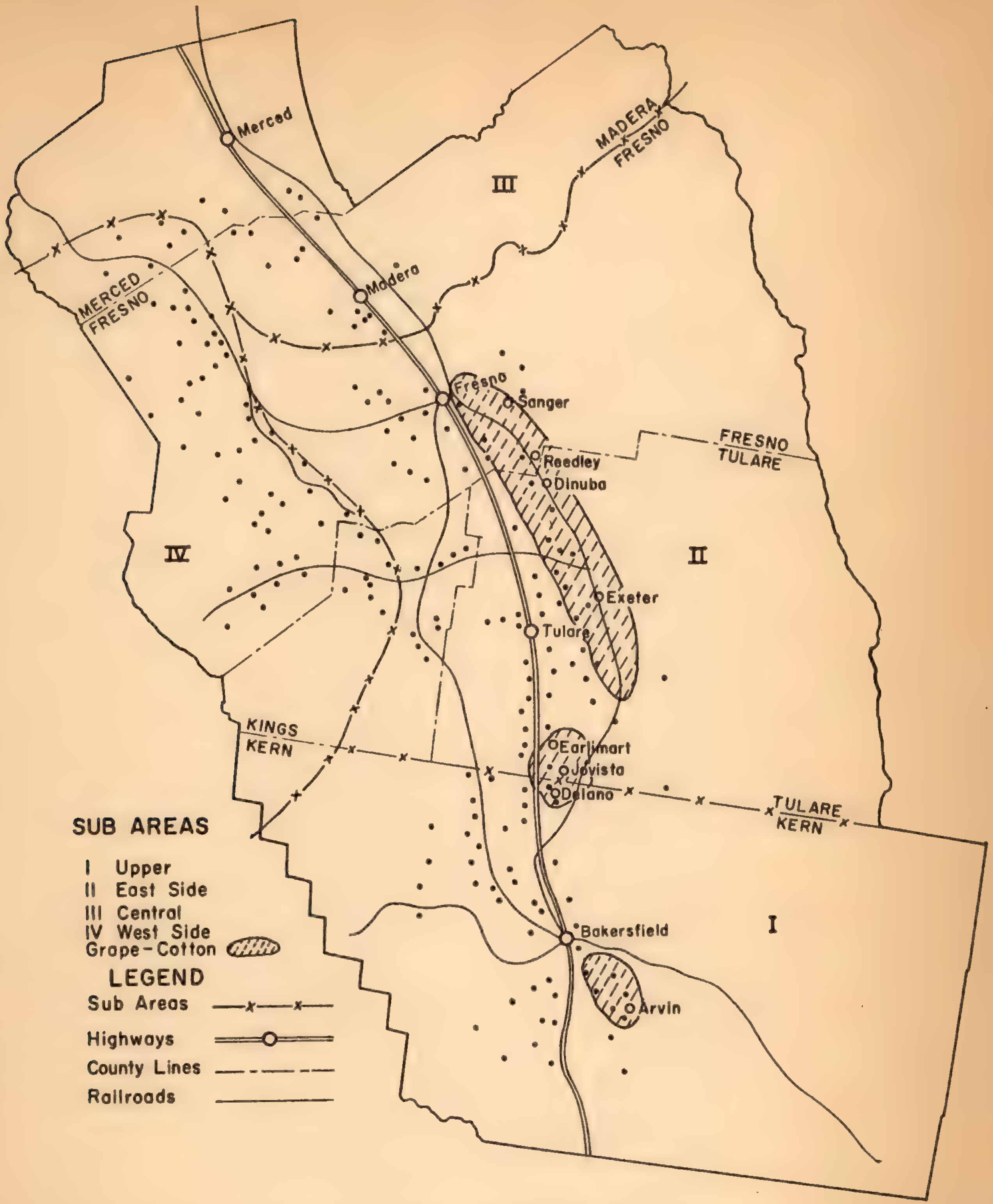
[1] A study of allotment effects on the Upper San Joaquin Valley appeared prior to this publication. See Hedges, Trimble R., Farm Adjustments and Earnings under 1955 Cotton Acreage Allotments. 1. Upper San Joaquin Valley Cotton Farms, 1953-55, Calif. Agr. Exp. Sta., Giannini Foundation of Agricultural Economics, Mimeo. Report No. 191, December, 1956.

[2] A fifth farm organization on the Eastside was analyzed in a previous publication. See Athanassatos, D. C. and T. R. Hedges, Farm Adjustments and Earnings under 1955 Cotton Acreage Allotments. 2. Small Grape-Cotton Farms on the San Joaquin Valley Eastside, 1953-1955, Calif. Agr. Exp. Sta., Giannini Foundation of Agricultural Economics, Mimeo. Report No. 194, May, 1957.

Figure 1. Cotton Gins in the San Joaquin Valley by Subareas



Source: Cotton Gins, Courtesy Southern Pacific Railway Co.

U. S. Department of Agriculture provided the climatological data. We then used soil survey reports and technical studies of the Bureau of Reclamation to determine the nature of soil and water resources.

Data on farm size, relative numbers, total crop acres and cotton acreage per farm from 1953 through 1955 provided the bases for the "model" farm sizes and cropping plans for each year. These data come from the records of the California Agricultural Stabilization and Conservation Committee and from farmer questionnaires. 1/ Questionnaire replies contributed information on the acreages of fruit and field crops, other than cotton, which were grown in 1953 and 1954, and on cotton fertilization practices.

Farmer interviews provided organization, yield, and management data for typical cotton farms. We obtained the price and cost data from both governmental and private service agencies.

After preparing the "model" organizations, we developed calendars of operations for all crops. These calendars reflect the production practices of the farmers interviewed in the subarea, and supplementary information from other sources.

We used the budget method to analyze the net effect of cotton allotments. Each "model" had a specific cropping plan in 1953 and in 1955. Inputs and practices differ between years on each "model." The 1953 organization and net farm income are compared with the 1955 organization and net farm income.

Tables, prepared from calendars of operations, show use of power units, equipment, and irrigation water, and the fixed and variable costs of these items. We calculated for each crop the per acre and total physical inputs and costs in 1953 and 1955.

1/ 1,906 farmers on the Eastside returned questionnaires mailed in 1954.

Our final step was to develop summary profit and loss statements for each "model." We obtained yields and prices of farm products from appropriate governmental agencies, as well as from interviews and questionnaires.

NATURAL FACTORS FAVOR COTTON PRODUCTION IN THE SAN JOAQUIN VALLEY EASTSIDE

Much of the Soil Area is Productive for Cotton

Soil, its structure and inherent productivity, is a primary factor in crop production. By limiting or furthering the type and level of production, it determines to a considerable extent the most profitable crops.

Since cotton is the most profitable crop on many Eastside farms, producers devote their best soil to the production of this crop. The best soils of the Eastside are the alluvial fan and flood plain soils of the valley floor. These are also among the most productive soils in California. The cotton production pattern in the subarea roughly corresponds to the distribution of the alluvial land form.

The profile, texture, slope, and modifying features of alluvial soils vary from one location to another. The profile of recent alluvial soils is immature, hence these are prime agricultural soils. The soil on each farm depends upon its location relative to a particular fan. Four soil survey reports describe the region in which cotton production is confined. 1/ We used the Storie Index System to compare the soils in these four areas. The percentage of the surveyed land in each Storie grade is as follows:

Grade	Percent of total land surveyed
I (excellent)	19.4
II (good)	17.0
III (fair)	29.0
IV-VI (poor)	34.6
	100.0

1/ See Caton, Douglas D., Trimble R. Hedges and W. Neill Schaller, Inputs and Costs for Producing Field Crops (A Statistical Supplement to Farm Adjustments and Earnings Under 1955 Cotton Acreage Allotments). 3. San Joaquin Valley Eastside Cotton Farms, 1953-1955, Calif. Agr. Exp. Sta., Giannini Foundation of Agricultural Economics, Mimeo. Report No. 203. This publication cited is a companion report including the detailed information we used in preparing the present analysis and report. The same suggestion that we make for the soils information extends to all the detailed data in succeeding pages of this analysis. We, therefore, do not repeat this reference for each table concerned.

Climatic Factors Favor Cotton if Irrigation Water is Available

The climate of the Eastside valley is semi-arid. The mean annual precipitation at Fresno and at Visalia is under 10 inches, with most of the annual rainfall occurring in the period, October to April (Figure 1A).

Mean annual temperatures recorded at Fresno and Visalia favor long-season crops (Table 2). Winters are relatively mild. The average length of the growing season is 264 days at Visalia and 295 days at Fresno. Local variations in temperature and frost hazard exist; these variations influence the crop and fruit enterprise distribution within the subarea.

TABLE 2

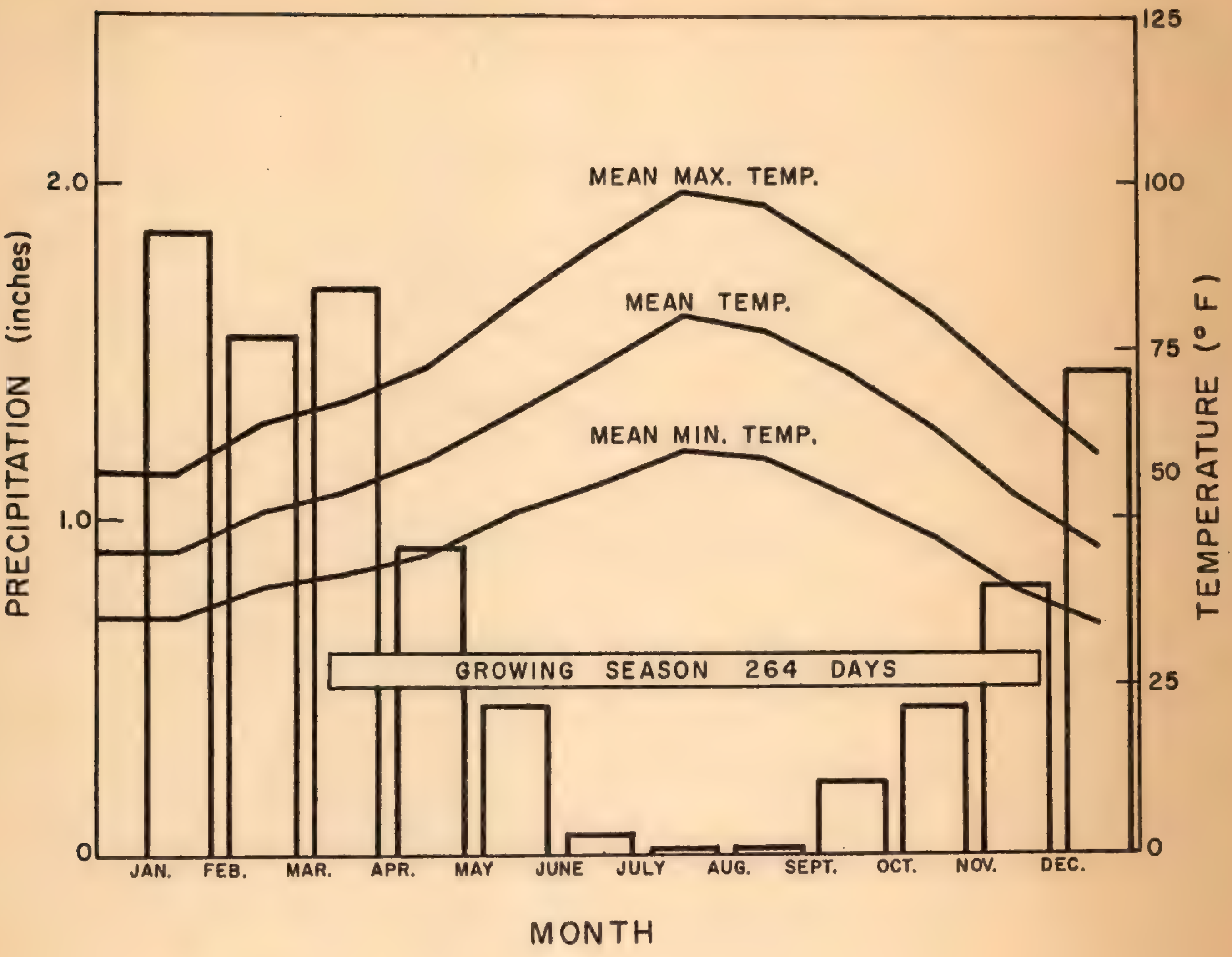
Climatic Summary: Fresno and Visalia, California

Climatic measure	Fresno 1	Visalia 2
Temperature (40-year record)		
January average	45.5° F	46.4° F
July average	81.3° F	80.3° F
Maximum recorded	115.0° F	115.0° F
Minimum recorded	17.0° F	13.0° F
Growing season (36-year record)		
Average date of last killing frost	Feb. 9	Mar. 9
Average date of first killing frost	Dec. 1	Nov. 28
Average length of growing season	295 days	264 days
Precipitation (40-year record)		
Mean annual	9.43 in.	9.59 in.

Source: U. S. Department of Agriculture, Yearbook of Agriculture, Climate and Man, 1941.

Due to the limited amount and seasonal distribution of rainfall, irrigation is essential to produce nonwinter crops. An excess of demand over annual supply

Figure 1-A. Precipitation, Temperatures, and Growing Seasons; Visalia[1]



[1] The San Joaquin Valley Eastside has scant rainfall, hot summers, and a long growing season. Irrigation is required for summer crops.

Sources: Climatological Data, U. S. Weather Bureau; Period Averages: Precipitation--53 years; Temperatures--mean 41 years, maximum and minimum 28 years.

of water throughout the San Joaquin Valley has accompanied new land development and urbanization. The result has been progressively lowered water tables. The main source of irrigation water for the Eastside lies in the Sierra Nevada Mountains to the east. The water reaches the valley by surface diversion and as groundwater.

A report released by the Bureau of Reclamation in 1949 provides data on the demand and supply of water in the Central Kaweah Delta of Tulare County. 1/ The Kaweah Delta has 214,330 gross acres. Increased pumping has provided adequate supplies for the Delta, but only at the expense of a lowered water table. The average annual overdraft of groundwater from the Delta was 13,466 acre feet from 1922 to 1946. The static water level in wells in the Tulare Irrigation District averaged less than 10 feet below the ground surface in 1907, but had declined to a mean of 58 feet below the ground in 1947. Water requirements in the peak use periods produce a drawdown which causes significant differences in seasonal water availability. Farm operators practice off-season irrigation to store moisture in the soil when water is more available.

The Bureau of Reclamation projected 1922-1946 water supply and use in the Delta to estimate the irrigation conditions for 1960. The projection includes an estimated consumptive use in the Delta of 435,000 acre feet per year by 1960, an increase of 164,500 acre feet over the average annual use from 1922-1946. Without supplemental water the 1960 consumptive use would create an average annual overdraft of 228,100 acre feet. Present provisions for balancing supply and demand include diversion from the Friant-Kern Canal.

The Bureau of Reclamation report estimated that the average cost of irrigation water in the Tulare Irrigation District was $2.15 per acre foot

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1/ Bureau of Reclamation, U. S. Department of the Interior, Technical Studies in Support of Factual Report, Tulare Irrigation District, February, 1949.

in 1947. This cost was projected to $3.49 for 1960. While the supply and use conditions in the Delta are not necessarily of the same magnitude as those which confront cotton farms in other parts of the Eastside, the underlying problem is common to the entire subarea.

Weeds, Insects, and Diseases Require Controls and Increase Production Costs

The physical incidence of weeds, insects, and diseases on the Eastside is the least predictable of the conditions described. The degree of infestation changes continually. Economic loss to farmers is reflected through lowered yields, reduced quality, increased costs of production, and irrigation water loss.

The Bureau of Reclamation conducted a semi-detailed weed survey of the Tulare Irrigation District in 1948. 1/ The survey report confirms that farmers suffer an annual loss due to the presence of weed pests. Methods of distributing irrigation water, particularly the large number of open ditches, favor weed growth and dissemination. The aggregate amount of water consumed by all weeds is large enough to aggravate the limited irrigation water supply, and thereby to raise the cost of water.

Insect and disease infestation differ with each crop and varies greatly from field to field. Preventive and control measures afford protection against a number of insects, but protection increases the cost of production. Important among the insects and plant diseases which affect cotton production are spider mite, Lygus Bug, bollworm, cotton aphid, leaf-hoppers, root-knot nematode, and verticillium wilt.

1/ *Ibid.*

FAMILY FARM OPERATORS SHIFTED THEIR DIVERTED ACRES INTO ALFALFA AND FEED GRAINS

To determine possible production adjustments to cotton acreage allotments on the Eastside, one should begin by examining the subarea's physical characteristics. These physical factors set limits to the crops that farmers can produce. They also influence production costs for each of these crops. The producer's choice in adjustments depends upon price estimates for products as well as costs for productive service. His actual decisions are influenced not only by physical and economic possibilities but also by sociological and institutional considerations.

An adjustment may be either short-run or long-run. Changes in the kind, quantity, or methods in using variable production inputs and in the rate of using fixed inputs constitute short-run adjustments. The distinguishing feature of long-run adjustments is that they involve changes in the kind and quantity of fixed production inputs.

Farmers Could Make Short-run Adjustments Quickly, Without Heavy Investments

This study concentrates on short-run adjustments. With a reduction in his cotton acreage the producer can employ two types of short-run adjustments: (1) changes in his methods of producing cotton and (2) shifting diverted cotton acres to the most profitable alternative enterprise.

Possible changes in methods of producing cotton are four: (1) greater emphasis on the use of the best-adapted soil for growing cotton, (2) reducing the frequency that a given field produces cotton, (3) improved timing of operations, and (4) using additional or increased variable production inputs. These changes may tend to offset adverse effects of acreage reduction on net farm income by increasing yields and gross receipts on the allotted cotton

acreage, without proportional cost increases. The optimum adjustment answers the question: How far should a producer go in changing technology or in adding inputs? The governing principle in determining this optimum first employs the law of diminishing physical returns; it also involves economic principles that relate the price of the product and the cost of variable inputs. These principles jointly regulate the level of production that will yield the greatest net return. Questions related to field choices, the rate of land use, and timing operations are more difficult to quantify than those concerning changes in variable production inputs.

The fourth type of adjustment concerns the optimum use of diverted acres. To determine this optimum, the operator follows the same procedure used to decide the most profitable cotton operations. However, he must add one step: it is necessary to compare alternative land uses according to profit potentials.

The foregoing physical description and grower experience on the Eastside make it evident that a wide range of crops and livestock will grow where cotton has been the dominant crop. Soil, climatic, and biological conditions do not severely restrict the farmer's choice of alternatives, provided that irrigation water is accessible.

Price and cost considerations are important in farmer decisions on adjustments. The cost of irrigation water is high and continues to rise; crops having large water requirements are therefore in an unfavorable profit position unless high selling prices for these crops offset the water costs. Pests also can quickly change the earning capacity of a particular crop. When the spotted alfalfa aphid appeared in 1955 it presented a serious threat to the earnings position of alfalfa. The problems that farmers face in finding profitable alternatives to substitute for cotton on compulsorily diverted acres have not been simple!

Uncertainty about the future role of government in producing and pricing various alternative crops further complicates operator decisions. Eastside producers have had limited opportunities to use diverted cotton acres for the production of sugar beets; for example, this crop also is subject to acreage restrictions. Sugar beet allotments were increased in 1956, however, and this crop may become more available as an alternative on Eastside farms.

Many farmers share the problem of adjusting to cotton allotments. If growers divert a significantly large number of cotton acres to the same alternative crop, the production and market supplies of that crop also will increase to depress prices. This widespread nature of the adjustment problem thus further accentuates it by creating uncertainty regarding both the courses of action that individual growers will choose and the aggregate effects of such choices on markets and earnings for alternative crops.

The producer's choice of alternatives also is influenced by personal factors. Included here is his access to or control over production capital and the tenure arrangement under which he operates. His ability to manage efficiently likely will vary among alternative enterprises. The producer's personal preference for one alternative crop over another is a noneconomic consideration, but, in practice, this factor also may be important.

The optimum alternative use of acres diverted from cotton is not limited to producing another crop, or even livestock. For example, the Soil Bank conservation reserve may prove as attractive as alternative enterprises. However, the length and terms of the conservation reserve contracts may necessitate a longer-run adjustment. 1/ In one sense, Soil Bank payments constitute a

---

1/ The minimum length of the conservation reserve contract is three years. The acreage reserve program requires a one-year contract; however, the opportunity of banking soil under the acreage program applies only to specified portions of producer's cotton allotment and not to those acres which were in cotton prior to allotments.

minimum or "floor" income level for land use. If all possible production alternatives clearly return less than these payments, risk and uncertainty considered, the Soil Bank becomes the optimum alternative.

Long-run Adjustments Require Time and May Involve Heavy Capital Outlays

Many of the problems involved in short-run adjustments apply to determining long-run adjustments. Uncertainties about future price and cost relationships, and about institutional impacts are more serious--because farther away--than those applying to short-run decisions. Long-run adjustments on the other hand, lead to maximizing profits if they reflect sound decisions. Land improvement, changes in power and equipment, and other capital investments widen the range of alternative enterprises available to the producer; at the same time they increase capital hazards.

To determine whether to introduce long-run adjustments the producer must estimate the future for cotton acreage restrictions and price supports. Cotton has been clearly the most profitable crop on many Eastside farms. Producers, therefore, may be reluctant to reorganize plans and operations if there is a good possibility that the Government will relax or abandon restrictions on cotton acreage. A long-run adjustment requires more capital than short-run changes; it may also require new skills and broader management capacity. Tenancy contracts and their provisions are highly significant in connection with long-run adjustments. They often limit freedom in making operator decisions, and almost always present some difficulties in reorganization involving heavy capital outlays.

The Soil Bank takes on added importance as an alternative in the long-run view. These programs could conceivably provide a compromise solution between a profitable long-run reorganization and a less profitable short-run adjustment. A producer lacking the capital needed for reorganization or one who does not wish to assume the risk of long-run adjustments would be particularly interested.

We Emphasize Economic Adjustments in Our Analysis

The Eastside cotton producer has a number of adjustment opportunities involving both cotton and alternative land uses. He has problems in determining the best production adjustments and in overcoming obstacles to make them effective.

Our discussion should not convey the impression that the short-run and the long-run adjustment periods are independent decision areas. Many farm decisions, in fact, require the manager to consider both time periods simultaneously.

Although we have mentioned other considerations that influence the manager in selecting production adjustments, we are concerned in this study with his economic problems and how he solves them. This fact explains our emphasis in the following sections.

FARMS OF ALL SIZES RECEIVED ALLOTMENTS: ALL BUT SMALLEST REQUIRED ADJUSTMENTS

Small Units Dominated Farm Numbers, But Not Acreage

We devote the remainder of this study to determining and comparing the 1953 and 1955 net farm incomes on Eastside cotton farms. This requires us to examine the factors of production, their use and costs, weather conditions, and prices received as the interrelated physical and economic conditions regulating net farm income. Many of these conditions vary from year to year. To determine and compare net farm income is to identify and measure the influence of conditions responsible for earning variations. Our problem arises from an initial enforced change in using land under cotton acreage allotments. Further changes in associated factors occurred as producers adjusted to cotton acreage allotments. Price and cost changes in productive services, cotton, and other crops occurred during the same period.

This section examines use of the land factor between 1953 and 1955. We consider land use first for two reasons: (1) The reduced cotton acreage and resulting land use adjustments identify the initial relative effect of allotments, and (2) The data defining these general effects on farming patterns in the subarea provide a foundation for developing model farm organizations. We can analyze these models in detail to understand farm adjustments. Because of the myriad of cotton farm sizes and cropping patterns within the subarea, the effects of 1954 and 1955 allotments were not uniform. We required certain common denominators in terms of size and cropping pattern to facilitate determining income. These common denominators appeared in the broad examination of land use changes for the Eastside and characterize the model farm organizations.

California State Agricultural Stabilization and Conservation Committee records listed 9,609 Eastside farms holding cotton acreage allotments in

1954 (Table 3). The actual number of farms with cotton acreage in 1953 was 7,881. Many of the allotment holders had no acreage in 1953 but had grown cotton in 1951 or 1952 or in both of these years and thus qualified for allotments in 1954. The data in column 6, "Average Cotton Acres in 1953," for each class interval, represent the actual 1953 acreages divided by the actual number of farms growing cotton in 1953. We obtained the acres in column 5, "Average Cotton Acres, 3-year Average, 1951-1953," from individual farm records.

The distribution of farms according to size was such that 65 percent of the allotment holders had open cropland of 60 acres or less. These farms, though important in number, accounted for only 18 percent of the total cotton acres allotted to the subarea. In contrast, farms with over 660 cropland acres were relatively few in number but held a large share of the allotted cotton acreage.

The percentage of open cropland devoted to cotton on each farm varied inversely with the acreage of open cropland on the farm. Farms in the "1-20 acre" class interval devoted about three-fourths of their open cropland to cotton in 1953; the farms in the "1,100 and above" class grew cotton on about one-third of their open cropland in the same year.

The percentage reduction in cotton acres per farm under the 1954 and 1955 allotment programs was fairly uniform for farms having over 20 cropland acres (Table 4). Allotment regulations imposed no cuts on farms having five acres of cotton or less in the base period and less than average reductions on farms with five to fifteen acres in cotton. The total cotton acreage in 1954 was about 68 percent of the average 1951-1953 Eastside cotton acreage. This average decreased to 54 percent under the 1955 allotment.

TABLE 3

Farm Size, Average Cotton Acres, and Acres Diverted, 1954 and 1955: San Joaquin Valley Eastside

Cropland class intervals	Number of farms	Cropland		Average cotton acres				Diverted acres	
		Average per farm	Total	3-year average 1951-1953	1953	Final allotment 1954	Acres planted 1955 a/	3-year average to 1954	3-year average to 1955
	1	2	3	4	5	6	7	8	9
		acres							
1 - 20	3,424	12.7	43,520	7.9	10.4	8.9	7.1	1.0	- 0.8
21 - 60	2,805	37.5	105,160	22.8	26.2	16.0	12.7	- 6.8	- 10.1
61 - 100	1,119	78.0	87,298	46.6	50.5	30.4	24.2	- 16.1	- 22.4
101 - 220	1,168	149.0	174,054	84.8	87.0	55.3	43.9	- 29.5	- 40.8
221 - 420	593	298.2	176,858	166.6	161.9	107.7	85.5	- 58.9	- 81.1
421 - 660	237	518.1	122,798	259.6	248.5	172.2	136.7	- 87.4	-122.9
661 - 1100	141	842.1	118,735	416.8	411.8	277.5	220.4	-139.3	-196.4
1100 + above	122	4,191.6	511,373	1,345.2	2,041.8	903.1	717.0	-442.0	-628.2
Total	9,609	139.4	1,339,796	65.1	55.7	44.6	35.4	- 20.5	- 29.7

a/ Estimated.

Source: California Agricultural Stabilization and Conservation Committee.

TABLE 4

Effects of Allotments in Reducing Eastside Cotton Acreage, from 1953 to 1954, and 1955

Cropland class intervals	Average cotton allotments by years; percentages of average cotton acres per farm, 1951-1953	
	Under 1954 allotment	Under 1955 allotment a/
	1	2
	percent	
1 - 20	112.7	89.9
21 - 60	70.2	55.7
61 - 100	65.2	51.9
101 - 220	65.2	51.8
221 - 420	64.6	51.3
421 - 660	66.3	52.7
661 - 1100	66.6	52.9
1100 + above	68.5	54.4

a/ Estimated 1955 plantings.

Source: California Agricultural Stabilization and Conservation Committee.

Our Analysis Models Represent Three Family Farm Sizes

The farm size and cotton acreage data in the preceding section represented useful guides for deciding the specifications of our analysis models. Our objective, to determine net farm income for 1953 and 1955, led us to choose models typical of as many "family" cotton farms as possible. We were interested particularly in those farms on which cotton was the dominant crop prior to 1954.

The farms having 1-60 acres of cropland were not a homogeneous class in terms of size. Furthermore, field crop earnings on these units were inadequate to support a family in most instances. The result was that these "operators" tend consistently to supplement their earnings with returns from fruit and other farm enterprises or by outside employment. There is some evidence that many of these growers operated on a part-time or semi-retired basis. The percentage of open cropland devoted to cotton on the farms in each of these two classes was high. Nevertheless, the net income from cotton constituted a widely varying

percentage of total net farm income. Furthermore, as indicated above, the farms having small cropland acreages were not affected by the allotment programs to the same extent as the farms having more than 60 acres of cropland. For these reasons, we chose to omit this size group from other detailed study. 1/

At the other size extreme, farms having more than 420 cropland acres showed a wide dispersion of size about the midpoints of their class intervals. These farms were also relatively few in number, and they devoted a smaller percentage of the total cropland to cotton than farms in the three class intervals centering on 80, 160, and 320 acres.

These latter three farm sizes showed a central tendency about their midpoint acreages. One reason is that owners tend to sell land in multiples of 40 acres, based on the rectangular survey system. We recognized this situation in selecting the 80-acre, 160-acre, and 320-acre model farm sizes. Our actual data came from two sources: (1) the ASC cotton acreage data for the 80-, 160-, and 320-acre class intervals, and (2) the cotton acreage data provided by questionnaire returns from 763 Tulare County farms (Table 5). 2/

The ASC crop records included data on cotton acreage alone. Questionnaire returns from 763 Tulare County cotton growers provided data on changes in farm acreage for other crops, as well as cotton acreage information.

The Tulare County questionnaire returns represented about 8 percent of the Eastside cotton producers; however, the distribution of farms in each class interval corresponded closely to that of the ASC data, except for farms with

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1/ See Athanassatos, D. C. and T. R. Hedges, Farm Adjustments and Earnings Under 1955 Cotton Acreage Allotments. 2. Small Grape-Cotton Farms on the San Joaquin Valley Eastside, 1953-1955, Calif. Agr. Exp. Sta., Giannini Foundation of Agricultural Economics, Mimeo. Report No. 194, May, 1957.

2/ The contraction ASC, as used here and in succeeding pages, refers to the California state and county Agricultural Stabilization and Conservation Committees, through whose cooperation we obtained acreage data.

TABLE 5

Cotton Acreage in 1953, 1954, and 1955: Tulare County

Cropland class intervals	Average acres per farm	Number of farms	1953		1954		1955 a/		Changes in acreage	
			Total	Average	Total	Average	Total	Average	1953 to 1954	1954 to 1955
	1	2	3	4	5	6	7	8	9	10
1- 20	12.8	208	2,146	10.3	1,996	9.6	1,712	8.2	- 150	- 284
21- 60	37.4	225	6,185	27.5	4,141	18.4	3,552	15.8	- 2,044	- 589
61- 100	76.8	112	5,758	51.4	3,537	31.6	3,034	27.1	- 2,221	- 503
101- 220	154.9	119	12,528	105.3	8,414	70.7	7,218	60.7	- 4,114	-1,196
221- 420	295.2	56	10,304	184.0	6,904	123.3	5,922	105.8	- 3,400	- 982
421- 660	513.6	28	8,399	300.0	5,771	206.1	4,950	176.8	- 2,628	- 821
661-10,000	1,351.9	15	8,285	552.3	7,312	487.5	6,272	418.1	- 973	-1,040
Total	117.1	763	53,605	70.3	38,075	49.9	32,660	42.8	-15,530	-5,415

a/ Estimated.

Source: Questionnaire returns, 1954.

less than 20 cropland acres (Table 5). The average cotton acreage on the Tulare farms having 61-100 cropland acres varied little from the average cotton acreage on all subarea farms of this size. The Tulare farms having between 101 and 420 cropland acres did report average cotton acreages which were somewhat larger than those listed on the ASC records.

Although these two sources of data on cotton acreage did not agree in minute detail, we considered the Tulare County data sufficiently similar to the ASC data to indicate representative land use for crops other than cotton on the Eastside.

We show a detailed summary of acreage allocation in 1953 and 1954 as reported by Tulare County cotton growers (Table 6). The total increase between 1953 and 1954 in the number of farms reporting acreage in each land use category is useful for indicating the relative importance of these adjustments (Table 7).

The increase in acres devoted to feed grains, and the increase in the number of farms reporting a shift to feed grains were especially high between 1953 and 1954. Fallow land also increased from 1953 to 1954. The number of farms reporting corn acres in 1954 was 8 times the number reporting corn acres in 1953, and farms reporting milo and barley in 1954 represented over 3 times the number reporting acreage of these crops in 1953.

These data do not indicate land use experience in 1955. State acreages for 1955, however, indicate that the shift toward greater acreages of corn and grain sorghums continued on a state-wide level. 1/ Barley acreage for the State in 1955 showed a slight drop from the 1954 acreage, whereas alfalfa acreage for hay and seed combined was higher in 1955 than in 1954.

1/ California Crop and Livestock Reporting Service.

TABLE 6

Crops Other Than Cotton in 1953 and 1954: Tulare County

Cropland class interval	Average acres per farm	Number farms	Alfalfa			Irrigated pasture			Barley		
			Farms reporting	Acres		Farms reporting	Acres		Farms reporting	Acres	
				total	average		total	average		total	average
	1	2	3	4	5	6	7	8	9	10	11
1953											
1- 20	12.8	208	19	162	8.5	35	185	5.3	2	16	8.0
21- 60	37.4	225	65	993	15.3	64	414	6.5	3	60	20.0
61- 100	76.8	112	51	1,377	27.0	36	530	14.7	5	93	18.6
101- 220	154.9	119	58	3,131	54.0	34	866	25.5	7	496	70.8
221- 420	295.2	56	30	3,170	105.7	20	986	49.3	8	669	83.6
421- 660	513.6	28	23	2,909	126.5	12	966	80.5	8	711	88.9
661-10,000	1,351.9	15	10	2,123	212.3	11	1,635	148.6	7	3,845	549.3
Total	117.1	763	256	13,865	54.2	212	5,582	26.3	40	5,890	147.2
1954											
1- 20	13.0	208	17	142	8.4	36	190	5.3	4	51	12.8
21- 60	37.9	225	101	1,550	15.3	72	470	6.5	29	443	15.3
61- 100	75.3	112	64	1,825	28.5	43	659	15.3	21	369	17.6
101- 220	164.9	119	70	4,402	62.9	45	1,062	23.6	39	2,000	51.3
221- 420	286.8	56	36	3,506	97.4	21	1,176	56.0	24	1,685	70.2
421- 660	542.2	28	22	3,143	142.9	12	1,177	98.1	19	2,494	131.3
661-10,000	1,665.0	15	11	2,907	264.0	11	2,773	252.1	9	5,190	576.7
Total	117.1	763	321	17,475	54.4	240	7,507	31.3	145	12,232	84.4

Cropland class interval	Milo			Field corn			Other crops			Fallow		
	Farms reporting	Acres		Farms reporting	Acres		Farms reporting	Acres		Farms reporting	Acres	
		total	per farm		total	per farm		total	Average		total	Average
	12	13	14	15	16	17	18	19	20	21	22	23
1953												
1- 20				2	3	1.5	4	11	2.8	42	180	4.3
21- 60	5	42	8.4	3	18	6.0	9	131	14.6	80	632	79.0
61- 100	5	37	7.4	2	20	10.0	6	189	31.5	43	617	14.3
101- 220	5	142	28.4	5	114	22.8	11	391	35.5	44	794	18.0
221- 420	6	204	34.0	2	56	28.0	6	433	72.2	22	802	36.5
421- 660	2	65	32.5				5	361	72.2	10	929	92.9
661-10,000							7	1,361	194.4	6	3,030	505.0
Total	23	490	21.3	14	211	15.1	48	2,877	59.9	247	6,984	28.3
1954												
1- 20	4	16	4.0	10	44	4.4	6	25	4.2	82	276	3.4
21- 60	29	333	11.5	29	387	13.3	26	354	13.6	129	1,023	7.9
61- 100	13	297	22.8	23	374	16.3	18	480	26.7	63	912	14.5
101- 220	18	472	26.2	26	809	31.1	13	537	41.3	69	1,932	28.0
221- 420	10	465	46.5	12	692	57.7	13	934	71.8	34	1,158	34.1
421- 660	5	297	59.4	6	365	60.8	6	755	125.8	20	1,373	68.6
661-10,000	2	600	300.0	4	460	115.0	7	2,055	293.6	10	4,018	401.8
Total	81	2,480	30.6	110	3,131	28.5	89	5,140	57.8	407	10,692	26.3

Source: Questionnaire returns, 1954.

TABLE 7

Land Use Changes from 1953 to 1954: Crops Other Than Cotton, Tulare County

Land use	Total increase in: Farms reporting, 1953 to 1954	Total increase in: Acres reported, 1953 to 1954	Percentage increase in acres reported, 1953 to 1954
	1	2	3
Alfalfa	65	3,610	26.0
Irrigated pasture	28	1,925	34.5
Barley	105	6,342	107.7
Milo	58	1,990	406.1
Field corn	96	2,920	1,383.9
Other crops	41	2,263	78.7
Fallow	160	3,708	53.1

Source: Questionnaire returns, 1954.

The Tulare County questionnaire returns as well as data obtained from farmer interviews enabled us to complete our selection of land use patterns on the model farms for 1953 and 1955. We included two organizations under the 320-acre farm size. This subdivision was necessary to reflect variations among farms in the cropping pattern adjustments on acres diverted from cotton in 1954 and 1955. Operators on the 320-1 organization planted corn, while those with the 320-2 organization shifted diverted acres into barley.

We are convinced that the cropping pattern changes on Eastside farms between 1953 and 1955 are not due solely to cotton acreage allotments. On the other hand, we believe that the allotment program was the major force associated with such changes on the 80-, 160-, and 320-acre farms.

TABLE 8

Crops and Land Use on Farm Models, 1953-1955

80-Acre Farm

Land use	1953	1954	1955
	1	2	3
	acres		
Cotton	51	32	26
Alfalfa	20	26	34
Field corn	--	12	10
Idle or fallow	3	4	4
Total cropland	74	74	74
Noncultivated	6	6	6
Total land	80	80	80

160-Acre Farm

Land use	1953	1954	1955
	1	2	3
	acres		
Cotton	99	65	54
Alfalfa	41	50	55
Field corn	--	20	25
Idle or fallow	6	11	12
Total cropland	146	146	146
Noncultivated	14	14	14
Total land	160	160	160

320-Acre Farms

Land use	320-1 Farm			320-2 Farm		
	1953	1954	1955	1953	1954	1955
	1	2	3	4	5	6
	acres					
Cotton	183	120	100	183	120	100
Alfalfa	87	87	87	87	87	87
Field corn	--	63	83	--	--	--
Barley	--	--	--	--	83	103
Milo	10	--	--	10	--	--
Idle or fallow	20	30	30	20	10	10
Total cropland	300	300	300	300	300	300
Noncultivated	20	20	20	20	20	20
Total land	320	320	320	320	320	320

BOTH ORGANIZATIONAL CHANGES AND INCREASED COTTON INPUTS BROUGHT CHANGES IN PRODUCTION COSTS

We projected our four farm models in this analysis as fully owned, owner-operated or "family" units. These are irrigated farms with Storie Grade I and II soil. Our first step in analyzing each farm is to describe the capital investment and farm organization. Next, we identify and compare the fixed and variable production costs in 1953 and 1955. The cropping plan revisions that producers made between 1953 and 1955 changed the production cost structure. In addition, operators increased water and fertilizer applications on their allotted cotton acres in 1955, thus accounting for further cost changes.

Cotton yields increased between 1953 and 1955, but this increase was not due entirely to increased water and fertilizer. Farmers stressed in their interviews that a part of their cotton yield increases reflect better timing for seedbed preparation, irrigation, insect control, and cultivation. They also pointed out the effects of reduced cotton acreage in permitting less frequent cotton planting on a particular field. Our analysis makes no attempt to evaluate the effects of these yield-increasing factors other than changes in the inputs of water and fertilizer. This omission is not because we consider the others unimportant. Rather it is for the reason that it proved impossible to quantify them, and measure their effects within the framework of this study.

The effect of increased yield appears on the "returns" side of the analysis wherein we consider changes in gross receipts by crops and for the farm as a whole. Our last step is to determine farm earnings of each model in 1953 and 1955. We employed the budget method to analyze each model farm situation. The analytical procedure for the first organization, the 80-acre farm, appears in more detail than will be necessary for subsequent farms.

INCREASED COTTON YIELDS AND PRICES, ALFALFA PRICES IN 1955 ELIMINATED MOST OF THE 1953 LOSSES FOR 80-ACRE FARMS

Investments and Fixed Costs Made Little Change, But Variable Expenses Decreased

The typical 80-acre farm had the following current investments excluding land for which we do not have accurate data:

Item	Investment (1955 prices)	Percent of total investment
Power [1]	$ 4,700.00	44.0
Equipment	3,181.50	30.0
Irrigation system	2,743.40	26.0
Total	$10,624.90	100.0
Per acre	132.81	

The new replacement cost of the farm's resources, excluding land, amounted to $18,670 at 1955 prices (Table 9).

The farm had two wheel tractors, one W-1 (20-25 h.p.) and one W-2 (25-35 h.p.), and the operator owned one 1/2-ton pickup truck. Specialized cotton equipment was limited to cotton trailers; the farmer did not own a mechanical cotton harvester. Farm equipment used only for hay crops included a power mower and a side delivery rake.

Farmer interviews indicated that certain equipment items were typically owned but not used on cotton farms in either 1953 or 1955. This equipment is not fully depreciated and therefore incurs annual fixed costs of ownership. (Usually this equipment is on the farm for the reason that the operator elected to retain it at the time that he had the opportunity to trade it in when buying new equipment.) The existence of such equipment, idle but operable, represents a hedge against crop loss resulting from untimely failure of equipment currently employed. This means that the operator has considered the sale or trade-in of

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1/ Includes $310 in unused "standby" equipment.

TABLE 9

Physical Resources and Investments for Typical 80-acre Farm, 1955 Prices

Item	Size or capacity	Amount	New cost		Average investment a/	
			Per unit	Total	Per unit	Total
	1	2	3	4	5	6
			dollars			
Land:						
Total	80 acres					
Total cultivated	74 acres					
Irrigation system:						
Pumping plant	30 h.p.; 1,000 g.p.m.	1		3,000.00		1,537.50
Well, casing	12" diameter; 80' lift	200'	4.15	830.00	2.08	415.00
Pipe	12"	1,380'	.80	1,104.00	.40	552.00
Stands	7'-36"	1		63.00		31.50
Vents	7'-8"	2	4.90	9.80	2.45	4.90
Alfalfa valves	10"	12	15.00	180.00	7.50	90.00
Siphons	1"-2"	150	1.50	225.00	.75	112.50
Subtotal				5,411.80		2,743.40
Power:						
Wheel tractor	W-1 (20-25 h.p.)	1		2,000.00		1,400.00
Wheel tractor	W-2 (25-35 h.p.)	1		3,000.00		2,100.00
Pickup truck	1/2 ton	1		2,000.00		1,200.00
Subtotal				7,000.00		4,700.00
Equipment:						
Plow, 2 way	2-14"	1		453.00		226.50
Disk, offset	7 1/2'	1		650.00		325.00
Disk, tandem	10'	1		700.00		350.00
Spiketooth harrow	4' section	3	30.00	90.00	15.00	45.00
Cultipacker	10'	1		325.00		162.50
Planter	4 row	1		500.00		250.00
Cultivator	4 row	1		1,000.00		500.00
Cotton trailer	4 bale	3	350.00	1,050.00	192.50	577.50
Power mower	7'	1		350.00		175.00
Side delivery rake	8'	1		520.00		260.00
Ditcher b/	4'	1		135.00		67.50
Scraper b/	8'	1		485.00		242.50
Subtotal				6,258.00		3,181.50
Total				18,669.80		10,624.90

a/ $\frac{\text{New cost + Salvage value}}{2}$

No salvage values, except as follows:

W-1 tractor: $800
W-2 tractor: $1,200
Pickup truck: $400
4-bale cotton trailers: $35 each
Pumping plant: $75

b/ Standby equipment owned but not used in 1953 or 1955.

his "standby" equipment but believes that its annual fixed costs are less than the potential cost of crop loss. Technological changes in farm equipment, occurring in the past decade, largely explain why farmers substitute newer machinery for equipment with considerable remaining utility. More powerful and economical tractor and equipment units have not rendered the older, but post-war built units fully obsolete in every case. However, the newer equipment tends to complicate the problems in matching power and equipment units. Thus the older, and frequently smaller, pieces of equipment serve only a standby function. We, therefore, list nonused equipment as a cost item on all model farms, as explained in the following section.

The operator of the typical 80-acre farm obtained irrigation water from one well with a pumping plant capacity of 1,000 g.p.m. He used 1,380 feet of concrete pipeline in distributing water over the farm.

The operator supplied the labor for tractor and truck driving. He hired additional labor for irrigating and general chores. There was no family labor other than that of the operator. The operator rented a border disk and a stalk cutter, equipment used in the production of cotton, and a broadcaster for alfalfa seeding. Contract services for cotton included fertilizing, thinning, weeding, dusting, picking, and ginning. He also contracted seedbed preparation for alfalfa and the baling and roadsiding of alfalfa hay. 1/ Corn production in 1955 called for contracted fertilizing, picking, shelling, and hauling.

We listed production inputs per acre as the same in both 1953 and 1955 with two exceptions: (1) The per acre fertilization of cotton was increased from 74 pounds of nitrogen equivalent in 1953 to 100 pounds in 1955, and

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1/ The term, "roadsiding," refers to stacking baled hay adjacent to a road.

(2) An additional pre-irrigation of 2.4 inches per acre was applied on the allotted cotton acreage in 1955. We were unable to take into account and quantify such factors as changes in timing, land use rates, and more effective performance in cultural operations.

Production Costs Include Both Fixed and Variable Items

Production input prices in 1953 and 1955 are assumed to be identical. The fixed costs of the 80-acre farm consisted of:

1. Real estate taxes
2. Office expenses
3. Power costs
4. Equipment costs
5. Irrigation water costs
6. The cost of establishing a stand of alfalfa.

The variable expenses included those for:

1. Power
2. Equipment
3. Materials (irrigation water and seed)
4. Labor
5. Contract services
6. Interest on operating capital.

The budget analysis can take different forms depending upon the purpose of the analysis. In the short-run situation it frequently is necessary to compare only the variable costs of production. For this analysis, however, we elected to include both fixed and variable costs in the per acre and total costs of producing each crop. By including fixed costs in the crop budgets we were able to illustrate better the nature, extent, and effects of adjustments in using farm resources.

The total cost of producing an acre of cotton, for example, includes taxes, office expense, and fixed costs of power, equipment, and water which apply to that acre, as well as variable expenses. We calculated the fixed costs of power, equipment, and water according to the use of these items in producing an acre of cotton. We also charged each producing acre with other general

costs which do not lend themselves to an automatic allocation among producing acres. Among these are real estate taxes on nonproducing land, office costs for nonproducing cropland, fixed costs for nonused equipment, and the general costs of the farm pickup truck.

The following discussion will focus on the nature of costs and on the changes in per acre costs that occurred between 1953 and 1955.

Fixed Costs Were Largely Unchanged in this Short-run Analysis

Real estate taxes and office costs.--All model farms paid real estate taxes totaling $6.50 per acre in both 1953 and 1955. The total tax cost for the 80-acre farm was $520. We charged this amount to the crops produced on an acreage-weighted basis. [1] In 1953 the 80-acre farm had nine fallow and noncultivated acres which incurred a total tax cost of $58.50. In 1955 there were 10 nonproducing acres. As the acreage of idle land increases, the total farm tax concentrates on fewer producing acres.

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[1] The tax cost by crops is as follows:

Crop	Acres	% of total producing acres	Total tax costs* ($)	Per acre tax cost* ($)
	1	2	3	4
1953				
Cotton	51	72	374.40	7.34
Alfalfa	20	28	145.60	7.28
	71	100	520.00	
1955				
Cotton	26	37	192.40	7.40
Alfalfa	34	49	254.80	7.49
Corn	10	14	72.80	7.28
	70	100	520.00	

* For example, (cotton, 1953) total cost for the farm of $520 x 72% = $374.40, the total amount charged to cotton, ÷ 51 = $7.34, the amount charged to each acre of cotton.

Total office costs were $150 per year on the 80-acre farm. The several crops share this fixed cost, as real estate taxes, in accordance with the percentage of total acres under cultivation occupied by the crop. [1]

Power and equipment.--The total fixed costs of power units and equipment are (1) noncash: depreciation and interest, and (2) cash: taxes and insurance (Table 11). Since these are fixed, the cost per acre for the various kinds of power and equipment depends entirely upon annual use (Table 10). Per acre requirements of these items for crop production do not change between 1953 and 1955. We obtained fixed costs per unit of use (per hour for tractors and equipment and per mile for trucks) by dividing the annual fixed cost of each item by the annual use of the item. These fixed costs per unit of input plus variable expenses make up total unit costs (Table 13).

The 80-acre farm operator reduced his cotton acreage from 1953 to 1955 by 25 acres, from 51 to 26 acres. Of the acres diverted from cotton, he devoted 14 to alfalfa, 10 to corn, and one acre was fallowed (Table 8). Power and equipment used primarily to produce alfalfa increased in total annual use between 1953 and 1955. The unit fixed costs of the W-1 tractor, the mower, and the rake decreased as a result of greater annual use. On the other hand, unit fixed costs of power and equipment used primarily for cotton or for

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[1] Office expenses by crops is as follows:

Crop	Acres	% of total producing acres	Total office cost ($)	Per acre office cost ($)
	1	2	3	4
1953				
Cotton	51	72	108.00	2.12
Alfalfa	20	28	42.00	2.10
	71	100	150.00	
1955				
Cotton	26	37	55.50	2.13
Alfalfa	34	49	73.50	2.16
Corn	10	14	21.00	2.10
	70	100	150.00	

TABLE 10

Annual Power and Equipment Hours, 80-acre Farm; 1953 and 1955

Item	Cotton			Alfalfa			Corn		All crop total	
		total			total			total		
	per acre	1953 (51 acres)	1955 (26 acres)	per acre	1953 (20 acres)	1955 (34 acres)	per acre	1955 (10 acres)	1953	1955
	1	2	3	4	5	6	7	8	9	10
Power:										
W-1 tractor	.77	39.27	20.02	3.71	74.20	126.14			113.47	146.16
W-2 tractor	4.98	253.98	129.48	.35	7.00	11.90	4.87	48.70	260.98	190.08
Pickup truck									(7,500 miles)	
Equipment:										
Plow, 2w/2-14"	1.00	51.00	26.00				1.00	10.00	51.00	36.00
7 1/2' offset disk	.72	36.72	18.72	.19	3.80	6.46	.72	7.20	40.52	32.38
10' tandem disk	.76	38.76	19.76	.16	3.20	5.44	.76	7.60	41.96	32.80
8' spiketooth harrow				.10	2.00	3.40				
12' spiketooth harrow	.76	38.76	19.76	.06	1.20	2.04	.76	7.60	41.29 [a]	31.67 [a]
10' cultipacker	.27	13.77	7.02						13.77	7.02
4-row planter	.31	15.81	8.06				.32	3.20	15.81	11.26
4-row cultivator	1.97	100.47	51.22				1.85	18.50	100.47	69.72
4-bale cotton trailer	1.50	76.50	39.00						76.50	39.00
7' power mower				1.86	37.20	63.24			37.20	63.24
8' side delivery rake				1.74	34.80	59.16			34.80	59.16

[a] Total annual hours for 12' spiketooth harrow is 2/3 of 8' spiketooth harrow hours plus 12' spiketooth harrow hours.

cotton and corn increased between these years. The farm would have encountered a more serious overhead problem if cotton harvesting equipment had been owned. By using contract services extensively, the operator substituted variable expenses for the fixed and variable costs which would have accompanied ownership of additional row-crop and specialized equipment.[1]

Per acre requirements of cotton and corn for the W-2 tractor and row-crop equipment were comparable. By planting corn on diverted cotton acres, operators tended to lessen the increase in per acre fixed costs of these power and equipment items. However, they did not succeed entirely in avoiding increased per acre costs; the combined acreage of cotton and corn in 1955 was 36 acres as against 51 acres of cotton alone in 1953.

The 4-foot ditcher and the 8-foot scraper were standby equipment items owned by the 80-acre operator but not used in either year. We allocated the fixed costs of this equipment to the crops that ordinarily use the equipment. On the 80-acre farm these were cotton, alfalfa, and corn for the ditcher and scraper. Consequently, they bear the costs of this standby equipment.

Cotton was the only crop produced on the 80-acre farm requiring the pickup truck in specific operations. To haul cotton to the gin required 5 to 7 truck miles per acre of cotton.[2] Most of the annual truck mileage, a

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[1] This study does not explore in detail the difference between total costs of owning certain equipment and renting or contracting the services performed with such equipment. The effects of acreage allotments on production costs are, of course, different for farms owning equipment and farms contracting services.

[2] Truck mileage per acre for hauling cotton was determined as follows:

$$\text{Miles per acre} = \frac{\text{bales per acre}}{\text{capacity of trailer}} \times \text{round trip distance to gin}$$

Illustration: 1955 (Yield of 1.4 bales/acre; use of 4-bale trailer):

$$\frac{1.4}{4} \times 20 = 7.0 \text{ miles per acre}$$

total of 7,500 miles per year according to farmer interviews, was on general management function not directly related to production practices. We allocated both fixed and variable costs of pickup operation to crops. The allocated charge for cotton includes this hauling cost. To allow for the hauling of cotton and the relative importance of the cotton enterprise on the farms, we weighted the acreage of this crop as "two" and the acres of all other crops "one." For example, in 1953 there were 51 cotton acres and 20 alfalfa acres. The total weighted acreage was 2 x 51 (cotton) plus 1 x 20 (alfalfa) or a sum of 122 acres. The truck mileage assigned to cotton was $\frac{102}{122}$ x 7,500 or 6,270 miles. We charged the alfalfa enterprise with $\frac{20}{122}$ x 7,500 or 1,230 miles. This method of distributing truck costs is followed on all of the model farms.

The use of the same total annual truck mileage for 1953 and 1955 is not unreasonable. Cotton allotments and yield-increasing efforts on the part of the operator tended to involve additional travel on Eastside farms, despite the reduction in cotton acreage.

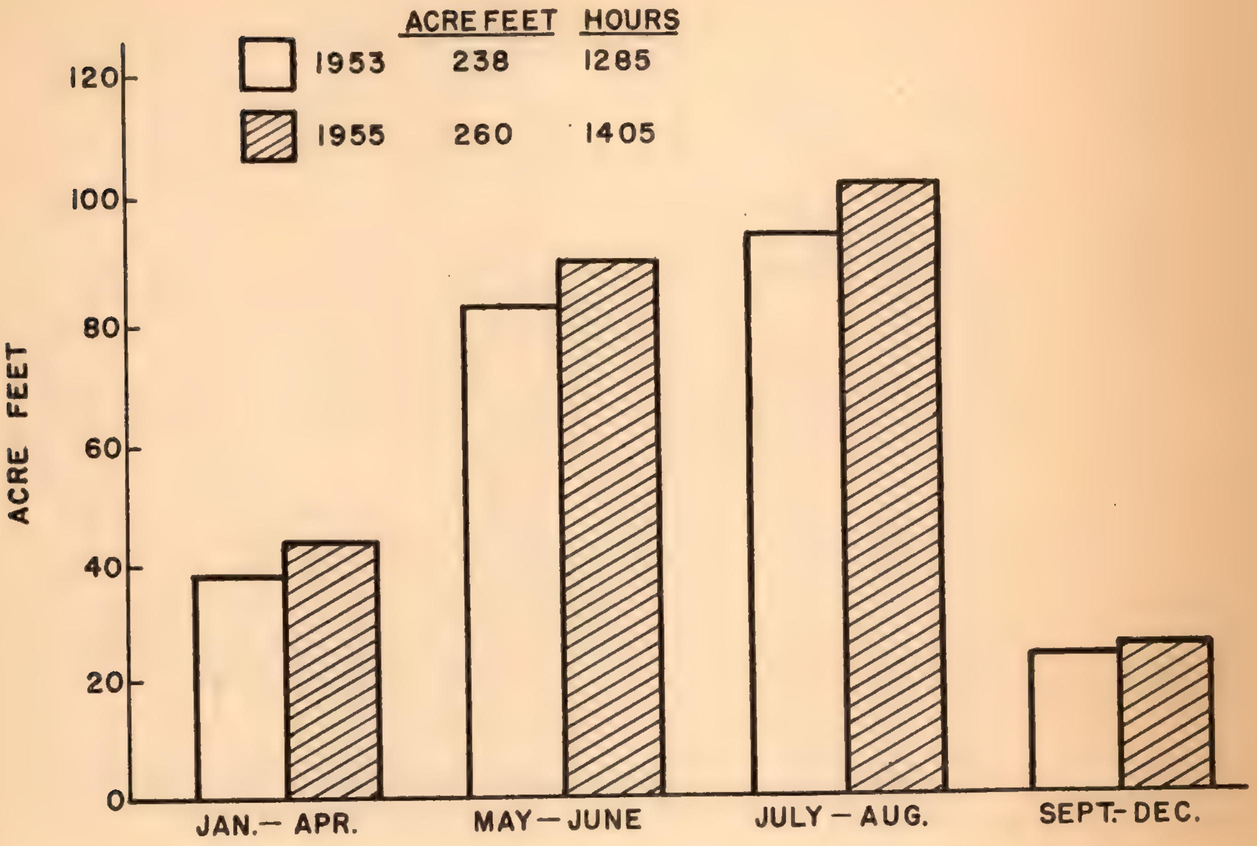
Irrigation water.--The 80-acre farm pumped 238 acre feet of water in 1953 and 260 acre feet in 1955 (Figure 2). Per acre applications of irrigation water for the crops grown were as follows:

Crop	1953	1955
	acre inches	
Cotton	36	38.4
Alfalfa	51	51.0
Corn	--	39.0

The changes in land use between 1953 and 1955 accounted for most of the increase in total water use, as indicated by the higher water requirements of alfalfa. A part of the total increase resulted from the additional pre-irrigation of allotted cotton acres in 1955.

Total fixed costs per acre foot of water (depreciation, interest, taxes, and insurance) decreased from $2.30 in 1953 to $2.10 in 1955, because the

Figure 2. Irrigation water use, 80-acre Farm; 1953 and 1955



Total irrigation water use and pumping hours for the 80-acre farm increased from 1953 to 1955.

Source: Calculated from survey data.

operator used a greater proportion of the pumping capacity (Tables 11 and 13). The per acre fixed cost decrease was more noticeable for alfalfa than for cotton because of the difference in water requirements for these crops, and the slight increase in water applied to cotton in 1955.

The cost of establishing an alfalfa stand.--Farmers who produce alfalfa must establish new stands in accordance with the rotation system used and the normal productive life of the crop. In this analysis, practice calls for establishing one-fourth of the total alfalfa acreage each year. We prepared two input and cost tables for the alfalfa enterprise. One lists the inputs and costs for producing alfalfa and the other the inputs and costs for establishing an alfalfa stand. In 1955 the 80-acre farm had 34 alfalfa acres; the total cost for establishing this stand was $1,752. We charged one-fourth of this total cost against alfalfa production costs, as annual depreciation.

Total Variable Expenses Increased

Power and equipment.--The variable expenses for power cover fuel, lubrication, and repairs. Those for equipment include only repairs, which item also covers lubrication in this analysis. Repairs were the same for 1953 and 1955, and therefore took on the form of fixed costs (Table 12). 1/ For this reason changes in the cropping plan affected unit and per acre total variable expenses of power and equipment in much the same manner as they affected fixed costs (Table 13).

We charged the variable expense for operating the pickup truck to crop acres in the same manner as the above described fixed cost allocation. Variable expense per mile did not change, but the per acre allocation of mileage to each crop varied with the cropping plan.

1/ Constant annual repairs were indicated on most items although total use varied. The range of total annual use of power and equipment units between 1953 and 1955 was not wide enough to necessitate changes in annual repair work.

TABLE 11

Fixed Costs: Power, Equipment, and Irrigation Water, 80-acre Farm; 1953 and 1955

Item	Original cost	Life	Salvage value	Average investment a/	Annual noncash costs			Annual cash costs taxes and insur. d/	Total fixed costs
					depr. b/	int. c/	total		
	1	2	3	4	5	6	7	8	9
Power:									
W-1 tractor	2000	6	800	1400	200.00	70.00	270.00	46.67	316.67
W-2 tractor	3000	6	1200	2100	300.00	105.00	405.00	70.00	475.00
Pickup truck	2000	5	400	1200	320.00	60.00	380.00	54.00 e/	434.00
Subtotal							1,055.00	170.67	1,225.67
Equipment:									
Plow, 2w/2-14"	453	10		227	45.30	11.35	56.65	5.68	62.33
7 1/2' offset disk	650	10		325	65.00	16.25	81.25	8.12	89.37
10' tandem disk	700	10		350	70.00	17.50	87.50	8.75	96.25
12' spiketooth harrow	90	15		45	6.00	2.25	8.25	1.12	9.37
10' cultipacker	325	10		163	32.50	8.15	40.65	4.08	44.73
4-row planter	500	10		250	50.00	12.50	62.50	6.25	68.75
4-row cultivator	1000	10		500	100.00	25.00	125.00	12.50	137.50
4-bale cotton trailer (3)	1050	5	105	578	189.00	28.90	217.90	14.45	232.35
7' power mower	350	10		175	35.00	8.75	43.75	4.38	48.13
8' side delivery rake	520	10		260	52.00	13.00	65.00	6.50	71.50
4' ditcher f/	135	10		68	13.50	3.40	16.90	1.70	18.60
8' scraper f/	485	10		243	48.50	12.15	60.65	6.08	66.73
Subtotal							866.00	79.61	945.61
Irrigation water:									
Pumping plant	3000	20	75	1538	146.25	76.90	223.15	73.98	297.13
Well & casing	830	20		415	41.50	20.75	62.25	19.96	82.21
Pipeline	1177	30		588	39.23	29.40	68.63	28.28	96.91
Alfalfa valves	180	30		90	6.00	4.50	10.50	4.33	14.83
Siphons	225	5		113	45.00	5.65	50.65	5.44	56.09
Subtotal							415.18	131.99	547.17
Total fixed costs, all items							2,336.18	382.27	2,718.45

(Continued on next page.)

Table 11 continued.

a/ $\frac{\text{Original cost + Salvage value}}{2}$

b/ $\frac{\text{Original cost - Salvage value}}{\text{Life}}$

c/ 5 percent x average investment.

d/ 3.3333 percent x average investment (power).
2.5 percent x average investment (equipment).
4.81 percent x average investment (irrigation system).

e/ Includes $25 license and $25 insurance.

f/ Standby equipment.

TABLE 12

Variable Expenses: Power, Equipment, and Irrigation Water, 80-acre Farm
1953 and 1955

Item	1953			1955		
	Fuel & lube a/	Repairs	Total	Fuel & lube a/	Repairs	Total
	1	2	3	4	5	6
Power:						
W-1 tractor	62.41	72.50	134.91	80.39	72.50	152.89
W-2 tractor	156.59	70.00	226.59	114.05	70.00	184.05
Pickup truck	187.50	100.00	287.50	187.50	100.00	287.50
Subtotal			649.00			624.44
Equipment:						
Plow, 2w/2-14"		67.95	67.95		67.95	67.95
7 1/2' offset disk		97.50	97.50		97.50	97.50
10' tandem disk		105.00	105.00		105.00	105.00
12' spiketooth harrow		1.80	1.80		1.80	1.80
10' cultipacker		32.50	32.50		32.50	32.50
4-row planter		10.00	10.00		10.00	10.00
4-row cultivator		200.00	200.00		200.00	200.00
4-bale cotton trailer		31.50	31.50		31.50	31.50
7' power mower		35.00	35.00		35.00	35.00
8' side delivery rake		52.00	52.00		52.00	52.00
Subtotal			633.25			633.25
	Lube & power b/			Lube & power b/		
Irrigation water:						
Pumping plant	740.45	60.00	800.45	775.89	60.00	835.89
Pipeline		5.88	5.88		5.88	5.88
Alfalfa valves		.90	.90		.90	.90
Subtotal			807.23			842.67
Total variable expenses, all items			2,089.48			2,100.36

a/ W-1: $ .55 per hour
W-2: $ .60 per hour
Pickup: $ .025 per mile

b/ Power and lube costs obtained as follows:
Power cost = sum of following charges:
(1) Service charge ($192 for 30 h.p. motor)
(2) First 1,000 kw-hrs @ $ .014 per h.p.
(3) Second 1,000 kw-hrs @ $ .0085 per h.p.
(4) Remaining kw-hrs @ $ .006 per h.p.
Lube cost = 1 percent of power cost

$$\text{Kw-hrs} = \frac{\text{Rated h.p. x 100 x .746 x hrs. pumped}}{\text{Motor efficiency}}$$

TABLE 13

Unit Costs [a/]: Power, Equipment, and Irrigation Water, 80-acre Farm; 1953 and 1955

Item	Unit	Fixed cost per unit		Variable expense per unit		Total cost per unit	
		1953	1955	1953	1955	1953	1955
	1	2	3	4	5	6	7
Power:							
W-1 tractor	hour	2.79	2.16	1.19	1.05	3.98	3.21
W-2 tractor	hour	1.82	2.50	.87	.97	2.69	3.47
Pickup truck	mile	.06	.06	.04	.04	.10	.10
Equipment:							
Plow, 2w/2-14"	hour	1.22	1.73	1.33	1.89	2.55	3.62
7 1/2' offset disk	hour	2.20	2.76	2.41	3.01	4.61	5.77
10' tandem disk	hour	2.30	2.94	2.50	3.20	4.80	6.14
12' spiketooth harrow	hour	.23	.29	.04	.06	.27	.35
10' cultipacker	hour	3.25	6.37	2.36	4.63	5.61	11.00
4-row planter	hour	4.35	6.10	.63	.89	4.98	6.99
4-row cultivator	hour	1.37	1.97	1.99	2.87	3.36	4.84
4-bale cotton trailer	hour	3.04	5.96	.41	.81	3.45	6.77
7' power mower	hour	1.30	.76	.94	.55	2.24	1.31
8' side delivery rake	hour	2.06	1.21	1.49	.88	3.55	2.09
Irrigation water:	acre foot	2.30	2.10	3.39	3.24	5.69	5.34

[a/] Rounded.

Materials.--The total variable expenses for irrigation water (lubrication, power, and repairs) increased with greater pumping. However, total variable expenses did not increase in proportion to water pumped. This was because repairs were constant over the range of plant use while electrical costs increased with use of water, but at a decreasing rate. The total variable cost per acre foot of water decreased from $3.39 in 1953 to $3.24 in 1955 (Tables 12 and 13).

Labor costs.--The operator's labor appears as a variable expense at the going wage rate ($1.00 per hour), in the total costs for all farm models. We used this method to illustrate the change in utilization of the operator's labor between 1953 and 1955 and to obtain total production costs.

All operators used contract services extensively in producing all crops. Hence, operator's labor represented a small percentage of total variable expenses in both years. Lower annual use for the W-2 tractor and most equipment in 1955 brought a decrease in total driving hours (operator's labor). The operator contributed 558 hours of work in 1955 as against 632 hours in 1953. Total hired labor hours at $ .90 per hour increased in 1955 due to higher irrigation labor requirements. It was necessary to allocate driving hours to the several crops in proportion to the pickup miles already allocated. Thus the total operator labor cost for cotton includes three separate items: (1) tractor driving, (2) hauling cotton to the gin (1.5 hours of labor per acre for all farm models in both 1953 and 1955), and (3) a share of remaining truck driving time, i.e., allocated miles less specific miles for hauling. We determined the third item by using the rate of one hour of driving per 40 miles. The total operator labor cost for all other crops includes only costs for tractor and pickup driving, using the 40 miles per hour of time.

Contract services.--Contract costs accounted for 59 percent of the total variable expenses in producing cotton and 37 percent of the total for alfalfa.

This percentage increased to about 61 percent for cotton in 1955, primarily as the result of increased fertilization and higher yields. Cotton yields for the 80-acre farm were 1.1 bales per acre in 1953 and 1.4 bales in 1955. Alfalfa yields increased from 6.0 to 6.25 tons per acre between 1953 and 1955. The contract costs for alfalfa increased slightly due to this yield gain. Outlays for contract services accounted for 35 percent of total variable expenses incurred in the production of corn.

Changes in Production Costs Varied Among Crops

Total fixed costs for the farm, other than the special cost of establishing alfalfa, did not change between 1953 and 1955. Prices and the farm inventory remained constant. Fixed costs by category were as follows:

Item	Total fixed cost
Power	$1,225.67
Irrigation system	547.17
Equipment	945.61
Real estate taxes	520.00
Office expenses	150.00
Total	$3,388.45
Per acre	42.36

The annual charge for establishing alfalfa increased from $252 in 1953 to $448 in 1955, due largely to the increased alfalfa acreage. The unit costs of power and equipment used for establishing alfalfa stands also increased in 1955.

The total fixed and variable costs of producing an acre of cotton increased between 1953 and 1955 (Table 14). On the other hand, the per acre costs of producing alfalfa declined between these years.

No comparison with pre-allotment corn production costs is possible; this crop is a "newcomer" to the cropping plan. Nevertheless, corn production affects unit costs. Power, equipment, and water requirements for corn helped reduce unit costs of these inputs by spreading overhead over more acres and hours. The per acre costs of producing cotton would have increased more than

TABLE 14

Input Costs by Crops and Total Farm, 80-acre Farm; 1955 and 1953

	1955						
	Cotton (26 acres)		Alfalfa (34 acres)		Field corn (10 acres)		
Item	per acre	total	per acre	total	per acre	total	Total farm
	1	2	3	4	5	6	7
Fixed:	63.26	1,644.88	48.83	1,660.30	45.89	458.90	3,764.08
Variable:							
Power	11.58	301.08	6.74	229.16	7.68	76.80	607.04
Equipment	15.53	403.78	2.56	87.04	12.23	122.30	613.12
Materials	12.77	332.02	13.77	468.18	13.13	131.30	931.50
Labor	28.37	737.49	27.73	942.83	24.24	242.39	1,922.71
Contracts	113.60	2,953.56	32.82	1,115.88	34.40	344.01	4,413.45
Total variable	181.85	4,727.93	83.62	2,843.09	91.68	916.80	8,487.82
Total cost	245.11	6,372.81	132.45	4,503.39	137.57	1,375.70	12,251.90
	1953						
	(51 acres)		(20 acres)		(- - - -)		
Fixed:	50.08	2,554,02	52.52	1,050.48			3,604.50
Variable:							
Power	9.91	505.41	6.62	132.40			637.81
Equipment	10.98	559.98	4.35	87.00			646.98
Materials	12.59	642.09	14.43	288.60			930.69
Labor	26.50	1,351.65	27.30	545.93			1,897.58
Contracts	93.21	4,753.61	31.50	630.00			5,383.61
Total variable	153.19	7,812.74	84.20	1,683.93			9,496.67
Total cost	203.27	10,366.76	136.72	2,734.41			13,101.17

they did in 1955 without corn; corn and cotton production required comparable use of certain power and equipment items. At the same time, the water requirements of corn were lower than those of alfalfa. The cost per acre foot of water increases as more corn and less alfalfa occupies the land, at least within a range of use permitted by the existing system.

Gross Receipts and Earnings Increased While Costs Dropped

Total gross receipts in 1955 were $1,057 higher than in 1953 (Table 15). Cotton and alfalfa yields increased and so did prices for cotton lint and alfalfa hay. Cottonseed prices were lower in 1955 than in 1953, but not enough to offset the other price and yield increases; hence the rise in gross receipts. If there had been no change from 1953 to 1955 in the yield or price of cotton and alfalfa, gross receipts in 1955 would have been $10,257 instead of the $13,271 actual figure, a difference of over $3,000 (Table 15). The following text table shows the net result of these several yield and price changes:

Conditions	Gross receipts in 1955 a/	Reduction from observed gross receipts
	1	2
	dollars	
Observed change in YIELD and PRICE of:		
Cotton and alfalfa	13,271	
No change in YIELD and PRICE of:		
Cotton and alfalfa	10,257	3,014
Cotton alone	11,375	1,896
Alfalfa alone	12,153	1,118
No change in PRICE of:		
Cotton and alfalfa	11,778	1,493
Cotton alone	12,713	558
Alfalfa alone	12,336	935
No change in YIELD of:		
Cotton and alfalfa	11,593	1,678
Cotton alone	11,814	1,457
Alfalfa alone	13,050	221

a/ Rounded.

TABLE 15

Gross Receipts, Costs, and Earnings by Crops and Total Farm, 80-acre Farm; 1955 and 1953

Item	Cotton		Alfalfa	Field corn	Total farm
	lint	seed			
	1	2	3	4	5
1955					
Acres	26		34	10	70
Yield	1.4 bales[a/]	.595 tons[b/]	6.25 tons	35 cwt.	
Production	36.4 bales	15.47 tons	212.5 tons	350 cwt.	
Price	$167.30/bale	$46.00/ton	$26.00/ton	$2.70/cwt.	
	$6,089.72	$711.62			
Gross receipts	$6,801.34		$5,525.00	$ 945.00	$13,271.34
Costs (less land)	6,372.81		4,503.39	1,375.70	12,251.90
Receipts minus costs	$ 428.53		$1,021.61	$ -430.70	$ 1,019.44
Land interest ($400/acre c/ at 5%)	620.00		730.00	250.00	1,600.00
Net	$ -191.47		$ 291.61	$ -680.70	$ -580.56
	Add:				
	Interest on fixed capital (incl. land)				2,131.40
	Operator's labor d/				558.10
	Net farm income				$ 2,108.94
	Less:				
	Operator's labor				2,500.00
	Return to capital and management				$ -391.06
	Rate earned on investment				-0.92%
1953					
Acres	51		20		71
Yield	1.1 bales[a/]	.467 tons[b/]	6.0 tons		
Production	56.1 bales	23.84 tons	120 tons		
Price	$148.99/bale	$53.00/ton	$21.60/ton		
	$8,358.34	$1,263.52			
Gross receipts	$ 9,621.86		$2,592.00		$12,213.86
Costs (less land)	10,366.76		2,734.41		13,101.17
Receipts minus costs	$ -744.90		$ -142.41		$ -887.31
Land interest ($400/acre c/ at 5%)	1,110.00		490.00		1,600.00
Net	$-1,854.90		$ -632.41		$-2,487.31
	Add:				
	Interest on fixed capital (incl. land)				2,131.40
	Operator's labor d/				631.74
	Net farm income				$ 275.83
	Less:				
	Operator's labor				2,500.00
	Return to capital and management				$-2,224.17
	Rate earned on investment				-5.22%

a/ 500 lb. bales (lint: 478 lbs.; bagging and ties: 22 lbs.).

b/ 850 lbs. or 0.425 tons of seed per bale of lint.

c/ Bare land was valued at an arbitrary figure of $400 per acre. This value was estimated from available rental and assessment values and is the figure used for Grades I and II based on all farm models. We found it impossible to obtain a realistic current market value of land on the Eastside since property does not change hands frequently enough to suggest an average sale value. We do not present the $400 estimate as a precise market value. Readers should not interpret it as such.

d/ Includes total operator's labor used in producing crops and in establishing 1/4 of total alfalfa acreage.

Cotton receipts account for 63 percent and alfalfa receipts for 37 percent of the difference, $3,014, between 1955 gross receipts as shown, and 1955 gross receipts with 1953 yields and prices.

Total costs for the farm, less interest on land, decreased $849 between 1953 and 1955 with the result that receipts-minus-costs were $1,907 higher in 1955 than in 1953. The following costs and returns summary illustrates the impact of observed changes in land use, inputs, yields, prices, and non-identifiable factors on a per acre basis:

Per acre	Cotton		Alfalfa		Corn
	1953	1955	1953	1955	1955
	1	2	3	4	5
	dollars				
Gross receipts	188.67	261.59	129.60	162.50	94.50
Variable expenses[a]	153.19	181.85	84.20	83.62	91.68
Balance	35.48	79.74	45.40	78.88	2.82
Fixed costs	50.08	63.26	52.52	48.83	45.89
Balance	-14.60	16.48	-7.12	30.05	-43.07

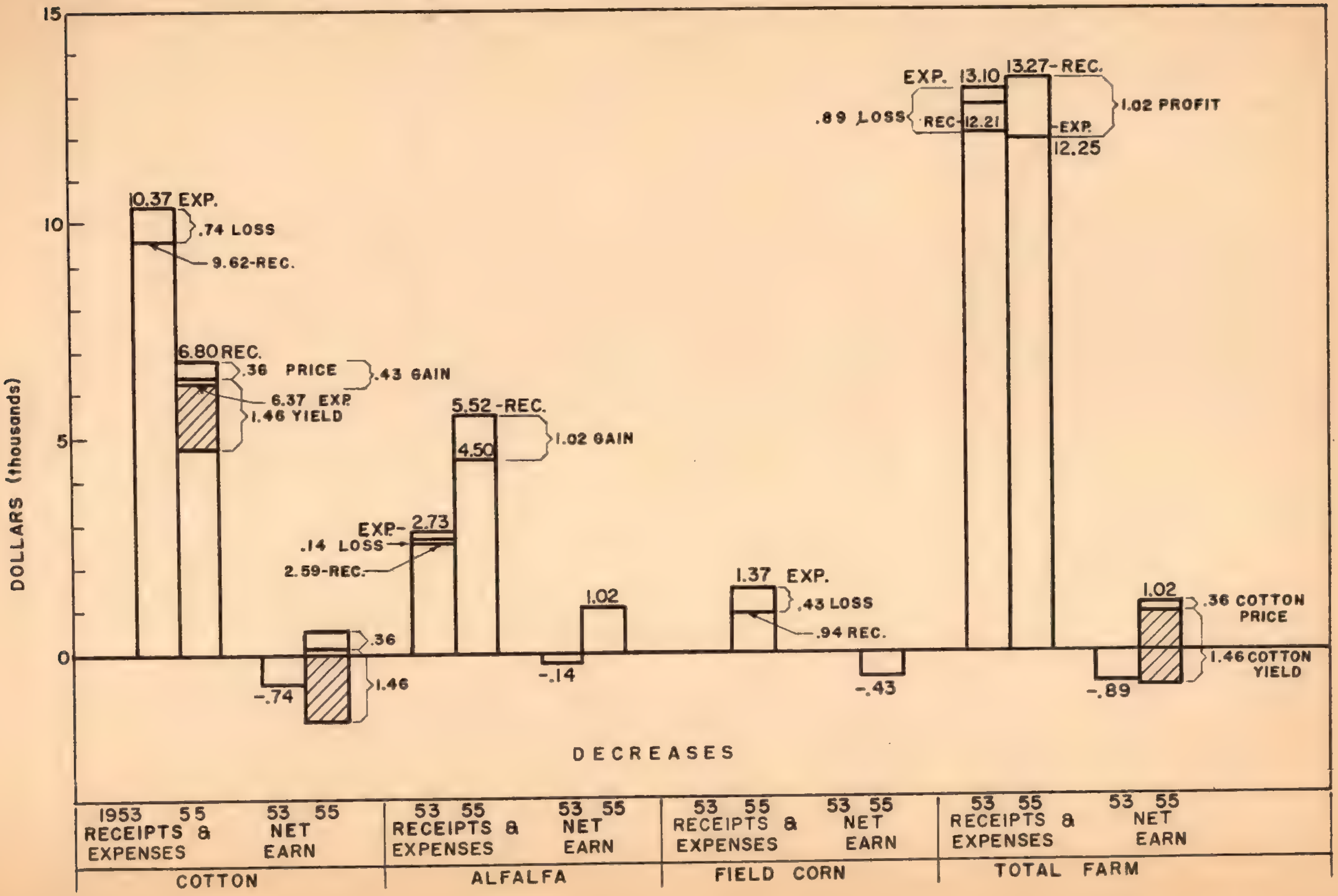
[a] Per acre variable expenses differ from these costs if we remove the following general farm costs (allocated): (1) variable expenses of the farm's pickup truck not specifically required in production, (2) labor and Social Security and Compensation Insurance costs accompanying the allocated truck mileage, and (3) interest on operating capital covering the allocated truck and Social Security costs. The resulting per acre costs are as follows:

Crop	1953	1955
Cotton	$145.49	$172.07
Alfalfa	80.23	78.59
Corn	--	86.58

The per acre gross receipts covered the per acre variable expenses incurred in the production of all crops. Neither cotton nor alfalfa receipts covered their respective per acre fixed costs in 1953; both crops, however, yielded plus net returns in 1955. Corn receipts failed to net enough over variable expenses to cover the per acre fixed costs.

Receipts-minus-costs, excluding interest on farm land, were $-887 in 1953 and $1,019 in 1955 (Figure 3). These were the amounts remaining after deducting

Figure 3. Changes in Gross Receipts, Expenses, and Net Returns on 80-acre Farm in San Joaquin Valley, Eastside, 1953-1955 (in thousands dollars)



The 80-acre farm earned a profit in 1955, as compared with a loss in 1953. Higher cotton yields and price gains for both cotton and alfalfa caused the improvement, in spite of losses from corn in 1955.

Source: Calculated from survey data.

all costs, including an imputed interest on fixed capital in power, equipment, and irrigation facilities and a total wage for the operator's labor. We calculated the imputed interest charge for power, equipment, and irrigation facilities at 5 percent on the average investment. This interest represents the "opportunity cost" or return which the operator might expect to receive by investing in an alternative use the capital he currently has invested in power, equipment, and irrigation facilities.

When we subtract from receipts-minus-costs an imputed cost of bare land, the net receipts become $-2,487 for 1953 and $-581 for 1955. The interest on land is also an opportunity cost; this amount represents 5 percent of the land value used in the analysis, i.e., $400 per acre. 1/ Neither the value of land used nor the rate of interest is precise; we do not suggest that we obtain precise measures of farm earnings by using them.

Net farm income represents the return to the operator for his labor, management, and capital. To obtain this measure we restored two items previously deducted from gross receipts, total interest on fixed capital, including land, and the value of the operator's actual labor. These costs are imputed rather than actual cash outlays.

Net farm income is the amount with which the operator must meet his family needs. In 1953 net farm income was $276 while in 1955 it was $2,109.

We assume that the operator could have earned $2,500 a year from his labor in an alternative occupation; hence we deducted $2,500 from net farm income to obtain the operator's return for his capital and management ($-2,224 in 1953 and $-391 in 1955). Another measure of this return is the rate earned on

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1/ The imputed interest charge, not only for land but also for power, equipment, and irrigation facilities, is an arbitrary noncash figure, since the interest rate is not a standard percentage.

irrigation facilities and a total wage for the operator's labor, a rate of the imputed interest charge for power, equipment, and irrigation facilities at 5 percent on the average investment. This interest represents the "opportunity cost" or return which the operator might expect by investing in [illegible] alternative use the capital he currently has invested in power, equipment, and irrigation facilities.

We have [illegible] [illegible] [illegible] as imputed cost of land [illegible] [illegible] $2,[illegible] for 1963 and [illegible] for land. [illegible] land [illegible] [illegible], this amount represents 5 percent of the value used in the capital, i.e., $400 per acre. 1/ Neither the value of land used nor the rate of interest [illegible]; we do not [illegible] [illegible] [illegible] [illegible] over a long time.

Net farm income represents the return to the operator for his land, management, and labor. To obtain this measure we subtract the [illegible] [illegible] [illegible], total interest on [illegible] [illegible], and the value of the operator's actual labor. [illegible]

Net farm income is the return which the operator [illegible] family [illegible]. In 1963 net farm income was [illegible] while in 1964 it was [illegible].

Assuming that the operator could have earned [illegible] from his [illegible] labor elsewhere [illegible]; hence we deducted $[illegible] [illegible] obtain the operator's return to his capital and management [illegible]. [illegible] another measure of this return is [illegible].

1/ The imputed interest charge, not only for land but also for power, equipment, and irrigation facilities, is [illegible]; [illegible] the interest rate is not a standard one [illegible].

investment, i.e., the return to capital and management divided by the total of average investments. The 80-acre farm had a negative rate of capital earnings in both years: -5.2 percent in 1953 and -0.9 percent in 1955. 1/ If the earnings had not gained from price changes between 1953 and 1955, the rate earned on investment in 1955 would have been much lower, -4.4 percent. Furthermore, if neither prices nor yields had improved, the rate would have dropped even more.

1/ The net farm income and the return to capital and management reflect actual dollar returns. The rate earned on investment indicates the level and change in earnings; it tells us nothing about the size of the business.

SLIGHT EARNINGS GAIN IN 1955 ON 160-ACRE FARM REFLECTS COTTON AND ALFALFA PERFORMANCE; CORN PROVED POOR COTTON SUBSTITUTE

Reduced Variable Expenses Dominated Changes From 1953 to 1955 on the 160-acre Farm, as for the 80-acre Unit

The 160-acre farm had the following current investments, excluding land:

Item	Investment (1955 prices)	Percent of total investment
Power	$ 6,940.00	38.6
Equipment 1/	3,994.00	22.2
Irrigation system	5,945.70	33.0
Improvements	1,125.00	6.2
Total	$18,004.70	100.0
Per acre	112.53	

The new replacement costs of the farm's resources, excluding land, totaled $32,064 at 1955 prices.

The farm had two W-1 tractors, one W-2 tractor, and one 1/2-ton pickup truck. The operator's equipment items did not include a cotton picker or a hay baler. Both the power units and the equipment inventories on this farm were similar to those of the 80-acre unit. Farmers on typical 160-acre farms owned only one additional tractor; equipment investments on the larger farm totaled only $812 higher.

Total investments in the irrigation system, on the other hand, were more than double those for the 80-acre farm. The 160-acre organization obtained water from two wells, each with a capacity of 900 g.p.m.; the distribution system included 3,600 feet of pipeline.

The 160-acre farm operator rented only one piece of equipment, the broadcaster for alfalfa seeding, but employed the same contract services as those utilized on the 80-acre farm. He picked cotton mechanically whereas the 80-acre operator used hand pickers. Mechanical harvesting is more economical

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1/ Includes $1,134 investment in standby equipment.

TABLE 16

Physical Resources and Investments for Typical 160-acre Farm, 1955 Prices

Item	Size or capacity	Amount	New cost		Average investment a/	
			Per unit	Total	Per unit	Total
	1	2	3	4	5	6
			dollars			
Land:						
Total	160 acres					
Total cultivated	146 acres					
Improvements:						
Tractor shed		1		750.00		375.00
Storage		1		1,500.00		750.00
Subtotal				2,250.00		1,125.00
Irrigation system:						
Pumping plant	30 h.p.; 900 g.p.m.	2	3,000.00	6,000.00	1,537.50	3,075.00
Well-casing	12" diameter; 80' lift	2x200'	4.15	1,660.00	2.08	830.00
Pipe	14'	3,600'	.90	3,240.00	.45	1,620.00
Stands	8' x 36"	2	72.00	144.00	36.00	72.00
Vents	8' x 8"	4	5.60	22.40	2.80	11.20
Alfalfa valves	10"	20	15.00	300.00	7.50	150.00
Siphons	3/4"-2"	250	1.50	375.00	.75	187.50
Subtotal				11,741.40		5,945.70
Power:						
Wheel tractor	W-1 (20-25 h.p.)	2	2,600.00	5,200.00	1,820.00	3,640.00
Wheel tractor	W-2 (25-35 h.p.)	1		3,000.00		2,100.00
Pickup truck	1/2 ton	1		2,000.00		1,200.00
Subtotal				10,200.00		6,940.00
Equipment:						
Plow, 2 way	2-16"	1		550.00		275.00
Disk, offset	6'	1		485.00		242.50
Disk, tandem	8'	1		600.00		300.00
Border disk		1		175.00		87.50
Spiketooth harrow	4' section	4	30.00	120.00	15.00	60.00
Cultipacker	10'	1		325.00		162.50
Planter	4 row	1		500.00		250.00
Cultivator	4 row	1		1,000.00		500.00
Cotton trailer	4 bale	2	350.00	700.00	192.50	385.00
Stalk cutter	2 row	1		325.00		162.50
Power mower	7'	1		350.00		175.00
Side delivery rake	8'	1		520.00		260.00
Ditcher b/	4'	1		135.00		67.50
Scraper b/	8'	1		485.00		242.50
Plow, 2 way b/	2-14"	1		453.00		226.50
Lister b/	4 row	1		350.00		175.00
Cultivator b/	2 row	1		350.00		175.00
Cotton trailer b/	6 bale	1		450.00		247.50
Subtotal				7,873.00		3,994.00
Total				32,064.40		18,004.70

(Continued on next page.)

Table 16 Continued.

a/ $\dfrac{\text{New cost + Salvage value}}{2}$

No salvage values, except as follows:

W-1 tractor: $1,040 each
Pickup truck: $400
6-bale cotton trailer: $70
W-2 tractor: $1,200
4-bale cotton trailer: $35 each
Pumping plant: $75 each

b/ Standby equipment owned but not used in 1953 or 1955.

for sizeable cotton acreages than for those possible on 80-acre units, particularly when acreage allotments are in effect.

Water and fertilizer inputs to cotton increased between 1953 and 1955. The operator applied an additional 2.4 acre inches of water per acre in 1955 and increased per acre fertilization from 88 pounds of nitrogen equivalent in 1953 to 109 pounds in 1955. Seedbed preparation and cultivation for all crops on the 160-acre farm were similar to those on the 80-acre unit although the same job was often performed by different power units or different sized equipment on the 160-acre farm.

Acreage Shifts Affected Both Fixed Costs and Variable Expenses

The itemized listings of inputs and costs for producing cotton, alfalfa, and corn on the 160-acre farm are similar to those for the 80-acre unit, though differing in amounts. The fixed and variable cost treatment outlined in the discussion of the 80-acre farm also applies in the following analysis of the 160-acre organization. An additional cost, the fixed cost of improvements, however, applies on the 160-acre unit.

Corn and Fallow Acres Caused Fixed Cost Redistribution

Real estate taxes, office costs, and improvements.--The 160-acre farm had 20 fallow and noncultivated acres in 1953, and these increased to 26 in 1955 (Table 8). The farm real estate taxes totaled $1,040, and represented a higher per acre cost in 1955 than in 1953 as a result of this drop in total crop acres. 1/

1/ The tax cost is allocated as follows:

Crop	Acres 1	% of total producing acres 2	Total tax costs ($) 3	Per acre tax cost ($) 4
1953				
Cotton	99	71	738.40	7.46
Alfalfa	41	29	301.60	7.36
	140	100	1,040.00	
1955				
Cotton	54	40	416.00	7.70
Alfalfa	55	41	426.40	7.75
Corn	25	19	197.60	7.90
	134	100	1,040.00	

Annual office costs of $225 and improvement costs of $176.25 appear as crop costs on an acreage-weighted basis. [1] The per acre costs of these items, like per acre tax costs, increased slightly between 1953 and 1955 for cotton and alfalfa.

Power and equipment.--We calculated the annual use and fixed costs of power units and equipment as for the 80-acre model (Tables 17 and 18). Also as in the 80-acre farm (per hour and per mile), we listed fixed costs and variable expenses for power and equipment separately (Table 20).

The operator had 99 cotton acres in 1953 and 54 in 1955. Of the 45 acres cut out of cotton, he used 14 acres for alfalfa, 25 acres for corn, and 6 fallowed acres (Table 8).

The effects of these shifts in land use were similar to those cited for the 80-acre farm. The per hour fixed costs of owning both the W-1 and W-2 tractors, however, increased in 1955 on the 160-acre farm. [2]

The per hour fixed costs of each equipment item, other than alfalfa harvesting equipment, also increased between 1953 and 1955. The difference for the latter was because the added 14 alfalfa acres required more hours use for the mower and rake in 1955, and thus reduced the fixed costs per hour. By not owning a cotton picker the 160-acre farm operator avoided the sharply increased fixed costs per hour for this high investment item which would have accompanied the reduced cotton acreage.

The 160-acre farmers typically owned several pieces of standby equipment that they did not use in 1953 or 1955. We charged the fixed costs,

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[1] We determined office and improvement costs by crops using the acreage percentages listed in the preceding footnote. This meant multiplying the total cost by these percentages to obtain a total crop charge, and dividing the total crop charge by the number of acres to obtain a per acre crop charge. Improvement costs consisted of:
depreciation, $75.00; repairs, $45.00; and interest, $56.25.

[2] Per hour fixed costs of the W-1 tractor decreased on the 80-acre farm where the W-1 was used primarily for alfalfa. Cotton production called for greater use of the W-1 on the 160-acre farm than on the smaller units. When cotton acres were reduced, total annual W-1 use dropped about 65 hours.

TABLE 17

Annual Power and Equipment Hours, 160-acre Farm; 1953 and 1955

Item	Cotton			Alfalfa			Corn		All crop total	
	per acre	total		per acre	total		per acre	total		
		1953 (99 acres)	1955 (54 acres)		1953 (41 acres)	1955 (55 acres)		1955 (25 acres)	1953	1955
	1	2	3	4	5	6	7	8	9	10
Power:										
W-1 tractor	2.89	286.11	156.06	3.78	154.98	207.90	.50	12.50	441.09	376.46
W-2 tractor	3.25	321.75	175.50	.50	20.50	27.50	4.93	123.25	342.25	326.25
Pickup truck									(10,000 miles)	
Equipment:										
Plow, 2w/2-16"	.90	89.10	48.60				.90	22.50	89.10	71.10
6' offset disk	1.62	160.38	87.48	.40	16.40	22.00	1.62	40.50	176.78	149.98
8' tandem disk	.70	69.30	37.80	.18	7.38	9.90	.70	17.50	76.68	65.20
Border disk	.22	21.78	11.88				.22	5.50	21.78	17.38
8' spiketooth harrow	1.12	110.88	60.48	.28	11.48	15.40	1.12	28.00		
16' spiketooth harrow				.04	1.64	2.20			62.82 [a]	54.14 [a]
10' cultipacker	.27	26.73	14.58						26.73	14.58
4-row planter	.31	30.69	16.74				.31	7.75	30.69	24.49
4-row cultivator	1.62	160.38	87.48				1.68	42.00	160.38	129.48
4-bale cotton trailer	1.50	148.50	81.00						148.50	81.00
2-row stalk cutter	.50	49.50	27.00						49.50	27.00
7' power mower				1.86	76.26	102.30			72.26	102.30
8' side delivery rake				1.74	71.34	95.70			71.34	95.70

[a] Total annual hours for 16' spiketooth harrow is 1/2 of 8' spiketooth harrow hours plus 16' spiketooth harrow hours.

TABLE 18

Fixed Costs: Power, Equipment, and Irrigation Water, 160-acre Farm; 1953 and 1955

Item	Original cost	Life	Salvage value	Average investment a/	Annual noncash costs			Annual cash costs	Total fixed costs
					depr. b/	int. c/	total	taxes and insur. d/	
	1	2	3	4	5	6	7	8	9
Power:									
W-1 tractor (2)	5200	6	2080	3640	520.00	182.00	702.00	121.33	823.33
W-2 tractor	3000	6	1200	2100	300.00	105.00	405.00	70.00	475.00
Pickup truck	2000	5	400	1200	320.00	60.00	380.00	54.00 e/	434.00
Subtotal							1,487.00	245.33	1,732.33
Equipment:									
Plow, 2w/2-16"	550	10		275	55.00	13.75	68.75	6.88	75.63
6' offset disk	485	10		243	48.50	12.15	60.65	6.08	66.73
8' tandem disk	600	10		300	60.00	15.00	75.00	7.50	82.50
Border disk	175	10		88	17.50	4.40	21.90	2.20	24.10
16' spiketooth harrow	120	15		60	8.00	3.00	11.00	1.50	12.50
10' cultipacker	325	10		163	32.50	8.15	40.65	4.08	44.73
4-row planter	500	10		250	50.00	12.50	62.50	6.25	68.75
4-row cultivator	1000	10		500	100.00	25.00	125.00	12.50	137.50
4-bale cotton trailer (2)	700	5	70	385	126.00	19.25	145.25	9.62	154.87
2-row stalk cutter	325	10		163	32.50	8.15	40.65	4.08	44.75
7' power mower	350	10		175	35.00	8.75	43.75	4.38	48.13
8' side delivery rake	520	10		260	52.00	13.00	65.00	6.50	71.50
4' ditcher f/	135	10		68	13.50	3.40	16.90	1.70	18.60
8' scraper f/	485	10		243	48.50	12.15	60.65	6.08	66.73
Plow, 2w/2-14" f/	453	10		227	45.30	11.35	56.65	5.68	62.33
4-row lister f/	350	10		175	35.00	8.75	43.75	4.38	48.13
2-row cultivator f/	350	10		175	35.00	8.75	43.75	4.38	48.13
6-bale cotton trailer f/	450	5	45	248	81.00	12.40	93.40	6.20	99.60
Subtotal							1,075.20	99.99	1,175.21

(Continued on next page.)

Table 18 Continued.

Item	Original cost	Life	Salvage value	Average investment a/	Annual noncash costs depr. b/	int. c/	total	Annual cash costs taxes and insur. d/	Total fixed costs
	1	2	3	4	5	6	7	8	9
Irrigation water:									
Pumping plant	6000	20	150	3075	292.50	153.75	446.25	147.91	594.16
Well & casing	1660	20		830	83.00	41.50	124.50	39.92	164.42
Pipeline	3406	30		1703	113.55	85.15	198.70	81.91	280.61
Alfalfa valves	300	30		150	10.00	7.50	17.50	7.22	24.72
Siphons	375	5		188	75.00	9.40	84.40	9.04	93.44
Subtotal							871.35	286.00	1,157.35
Total fixed costs, all items							3,433.55	631.32	4,064.89

a/ $\frac{\text{Original cost + Salvage value}}{2}$

b/ $\frac{\text{Original cost - Salvage value}}{\text{Life}}$

c/ 5 percent x average investment.

d/ 3.3333 percent x average investment (power & self-powered machinery).
2.5 percent x average investment (equipment).
4.81 percent x average investment (irrigation system).

e/ Includes $25 license and $25 insurance.

f/ Standby equipment.

TABLE 19

Variable Expenses: Power, Equipment, and Irrigation Water, 160-acre Farm; 1953 and 1955

Item	1953			1955		
	Fuel & lube a/	Repairs	Total	Fuel & lube a/	Repairs	Total
	1	2	3	4	5	6
Power:						
W-1 tractor	176.43	150.00	326.43	150.58	150.00	300.58
W-2 tractor	205.35	70.00	275.35	195.75	70.00	265.75
Pickup truck	250.00	100.00	350.00	250.00	100.00	350.00
Subtotal			951.78			916.33
Equipment:						
Plow, 2w/2-16"		82.50	82.50		82.50	82.50
6' offset disk		72.75	72.75		72.75	72.75
8' tandem disk		90.00	90.00		90.00	90.00
Border disk		17.50	17.50		17.50	17.50
16' spiketooth harrow		2.40	2.40		2.40	2.40
10' cultipacker		32.50	32.50		32.50	32.50
4-row planter		10.00	10.00		10.00	10.00
4-row cultivator		200.00	200.00		200.00	200.00
4-bale cotton trailer		21.00	21.00		21.00	21.00
2-row stalk cutter		16.25	16.25		16.25	16.25
7' power mower		35.00	35.00		35.00	35.00
8' side delivery rake		52.00	52.00		52.00	52.00
Subtotal			631.90			631.90
	Lube & power b/			Lube & power b/		
Irrigation water:						
Pumping plant	1,556.92	120.00	1,676.92	1,586.26	120.00	1,706.26
Pipeline		17.03	17.03		17.03	17.03
Alfalfa valves		1.50	1.50		1.50	1.50
Subtotal			1,695.45			1,724.79
Total variable expenses, all items			3,279.13			3,273.02

a/ W-1: $ .40 per hour
W-2: $ .60 per hour
Pickup: $ .025 per mile

b/ Power and lube costs obtained as follows (per pump):
Power cost = sum of following charges:
(1) Service charge ($192 for 30 h.p. motor)
(2) First 1,000 kw-hrs @ $ .014 per h.p.
(3) Second 1,000 kw-hrs @ $ .0085 per h.p.
(4) Remaining kw-hrs @ $ .006 per h.p.
Lube cost = 1 percent of power cost

$$\text{Kw-hrs} = \frac{\text{Rated h.p. x 100 x .746 x hrs. pumped}}{\text{Motor efficiency}}$$

TABLE 20

Unit Costs a/: Power, Equipment, and Irrigation Water, 160-acre Farm; 1953 and 1955

Item	Unit	Fixed cost per unit		Variable expense per unit		Total cost per unit	
		1953	1955	1953	1955	1953	1955
	1	2	3	4	5	6	7
Power:							
W-1 tractor	hour	1.87	2.18	.74	.80	2.61	2.98
W-2 tractor	hour	1.39	1.46	.80	.81	2.19	2.27
Pickup truck	mile	.04	.04	.04	.04	.08	.08
Equipment:							
Plow, 2w/2-16"	hour	.85	1.06	.93	1.16	1.78	2.22
6' offset disk	hour	.38	.45	.41	.48	.79	.93
8' tandem disk	hour	1.08	1.27	1.17	1.38	2.25	2.65
Border disk	hour	1.11	1.38	.80	1.01	1.91	2.39
16' spiketooth harrow	hour	.20	.24	.04	.04	.24	.28
10' cultipacker	hour	1.67	3.07	1.22	2.23	2.89	5.30
4-row planter	hour	2.25	2.81	.32	.41	2.57	3.22
4-row cultivator	hour	.85	1.07	1.25	1.54	2.10	2.61
4-bale cotton trailer	hour	1.04	1.91	.14	.26	1.18	2.17
2-row stalk cutter	hour	.90	1.66	.33	.60	1.23	2.26
7' power mower	hour	.67	.47	.48	.34	1.15	.81
8' side delivery rake	hour	1.00	.75	.73	.54	1.73	1.29
Irrigation water:	acre foot	2.45	2.37	3.60	3.54	6.05	5.91

a/ Rounded.

depreciation, interest, taxes, and insurance, on these items to crops normally using the equipment, as follows:

Item	Fixed costs charged to:
4' ditcher	all crops
8' scraper	all crops
plow, 2w/2-14"	cotton & corn
4-row lister	cotton & corn
2-row cultivator	cotton & corn
6-bale cotton trailer	cotton

Our analysis assumes that the operator drove the pickup truck 10,000 miles annually on farm use. We allocated this mileage to crops, as on the 80-acre farm, and found pickup fixed costs per acre higher for both cotton and alfalfa in 1955 than 1953.

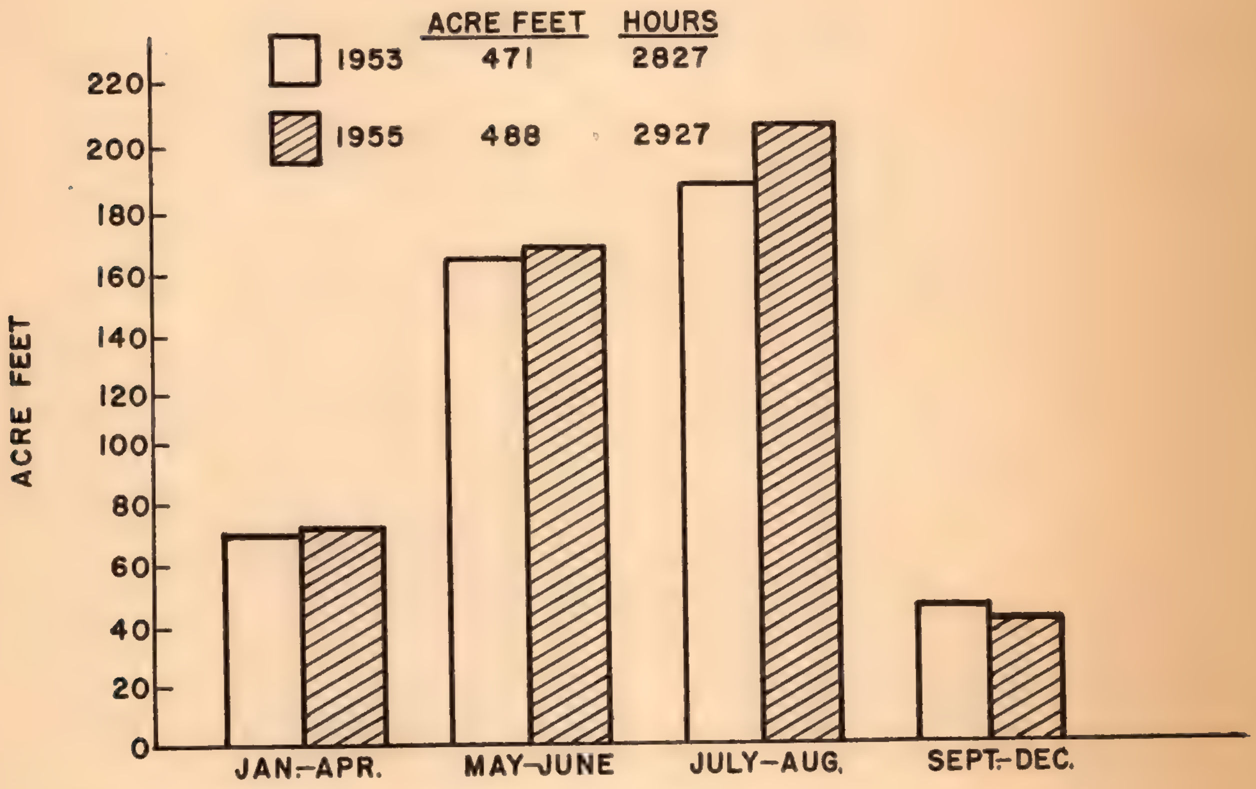
Irrigation water.--The 160-acre farm pumped approximately 471 acre feet of water in 1953 and 488 acre feet in 1955 (Figure 4). Annual per acre applications were the same as those for the 80-acre farm. The higher annual use reflected increased alfalfa acreage as well as the additional water inputs on cotton in 1955. The farm's producing acres numbered 140 in 1953 and 134 in 1955, but the increase in total crop requirements more than offset reduced irrigated acreage. Total fixed costs per acre foot of water decreased slightly, from $2.45 in 1953 to $2.37 in 1955 (Tables 18 and 20).

The cost of establishing an alfalfa stand.--We treated this special fixed cost item on the 160-acre farm the same as in the previous farm organization. The total cost of establishing alfalfa increased from $481 in 1953 to $656 in 1955 because of the increased acreage and increases in unit costs of power and equipment items.

Variable Expenses Increased for Power Units, Decreased for Irrigation Water

Power and equipment.--The annual repair costs for power units and equipment were the same in both 1953 and 1955 (Table 19). The variable expenses

Figure 4. Irrigation water use, 160-acre Farm; 1953 and 1955.



Total irrigation water use and pumping hours for the 160-acre farm increased from 1953 to 1955.

Source: Calculated from survey data.

per hour for all tractors and equipment, other than the mower and rake, increased between 1953 and 1955 due to repair expenses remaining constant (Table 20).

Materials.--The variable expense per acre foot for irrigation water declined slightly from $3.60 in 1953 to $3.54 in 1955. This decline reflected increased pumping; repair costs were constant, while electrical power cost increased at a decreasing rate (Tables 19 and 20).

Labor costs.--The 160-acre operators used contract services heavily and thereby substituted outside labor for what the operator otherwise would have furnished. The operator's total labor declined from about 1,166 hours in 1953 to 1,022 hours in 1955, due to reduced total tractor driving. As on the 80-acre farm, increased irrigator labor hours accompanied increased total farm water application.

Contract services.--The costs of all contract services accounted for approximately 61 percent of the total variable expenses for producing cotton, and for about 40 percent of the total variable expenses in producing alfalfa and corn. This percentage increased slightly in 1955 for cotton as the result of heavier fertilization and yield increases from 1.3 bales per acre in 1953 to 1.6 bales per acre in 1955. Alfalfa contract costs increased percentagewise in 1955, since the alfalfa yield increased from 6.0 to 6.25 tons per acre between 1953 and 1955.

The contract costs for cotton and alfalfa, except cotton picking, were the same per unit basis as those for the 80-acre farm. The 80-acre farm operator paid $42.00 per bale for hand picking while the 160-acre operator paid $24.50 per bale for machine picking.

Cotton Reductions Cut Total Farm Costs

The total fixed costs, by category, were as follows in 1953 and 1955:

Item	Total fixed cost
Power	1,732.33
Equipment	1,175.21
Irrigation system	1,157.35
Real estate taxes	1,040.00
Office expenses	225.00
Improvements	176.25
Total	5,506.14
Per acre	34.41

The special fixed cost of establishing alfalfa stands was the only fixed cost item that increased between 1953 and 1955. Prices paid by the operator were the same in both years, and the farm inventory did not change.

Per acre production costs increased between 1953 and 1955 for both cotton and alfalfa (Table 21).

By selecting corn as an alternative crop, the operator lessened the decline in total annual use of power units and equipment such as the W-2 tractor, the planter, and the cultivator. As on the 80-acre farm, the total operator's labor hours required per acre was highest for cotton and lowest for alfalfa. Corn affected labor utilization similarly on both farms.

Gains in Cotton Explain Most of the 1955 Profit Increases on 160-acre Farms

The 160-acre farm had more total gross receipts in 1955 than for 1953 in spite of the reduction in cotton acreage (Table 22). Increased cotton and alfalfa yields and cotton lint and hay prices accounted for the higher 1955 gross receipts. If there had been no change in yields and prices for cotton and alfalfa, gross receipts in 1955 would have been $5,913 lower than they were, i.e., $21,531 instead of $27,444. Cotton receipts account for 69 percent of the difference between $21,531 and $27,444. The following text table

TABLE 21

Input Costs by Crops and Total Farm, 160-acre Farm; 1955 and 1953

	1955						
	Cotton (54 acres)		Alfalfa (55 acres)		Field corn (25 acres)		
Item	per acre	total	per acre	total	per acre	total	Total acres
	1	2	3	4	5	6	7
Fixed:	48.37	2,611.72	45.77	2,517.91	38.31	957.70	6,087.33
Variable:							
Power	8.68	468.72	4.73	260.15	6.24	156.00	884.87
Equipment	6.96	375.84	1.59	87.45	5.77	144.25	607.54
Materials	13.69	739.26	14.99	824.45	14.07	351.75	1,915.46
Labor	24.69	1,333.46	23.43	1,288.91	21.36	534.03	3,156.40
Contracts	97.78	5,280.34	32.82	1,805.10	34.13	853.32	7,938.76
Total variable	151.80	8,197.62	77.56	4,266.06	81.57	2,039.35	14,503.03
Total cost	200.17	10,809.34	123.33	6,783.97	119.88	2,997.05	20,590.36
	1953						
	(99 acres)		(41 acres)		(- - - -)		
Fixed:	41.09	4,067.72	45.53	1,866.76			5,934.48
Variable:							
Power	7.68	760.32	4.12	168.92			929.24
Equipment	5.34	528.66	2.17	88.97			617.63
Materials	13.20	1,306.80	15.30	627.30			1,934.10
Labor	23.28	2,304.32	23.14	948.68			3,253.00
Contracts	83.28	8,245.09	31.50	1,291.50			9,536.59
Total variable	132.78	13,145.19	76.23	3,125.37			16,270.56
Total cost	173.87	17,212.91	121.76	4,992.13			22,205.04

lists the 1955 gross receipts which the farm would have received under different price and yield changes:

Conditions	Gross receipts in 1955 a/	Reduction from observed gross receipts
	1	2
	dollars	
Observed change in YIELD and PRICE of:		
Cotton and alfalfa	27,444	
No change in YIELD and PRICE of:		
Cotton and alfalfa	21,531	5,913
Cotton alone	23,340	4,104
Alfalfa alone	25,634	1,810
No change in PRICE of:		
Cotton and alfalfa	24,606	2,838
Cotton alone	26,119	1,325
Alfalfa alone	25,931	1,513
No change in YIELD of:		
Cotton and alfalfa	24,059	3,385
Cotton alone	24,417	3,027
Alfalfa alone	27,086	358

a/ Rounded.

Total costs for the farm declined $1,615 between 1953 and 1955 with the result that receipts-minus-costs were $1,671 higher in 1955 than in 1953. The following text table summary illustrates the per acre costs and returns for cotton, alfalfa, and corn in 1953 and 1955:

Per acre	Cotton		Alfalfa		Corn
	1953	1955	1953	1955	1955
	1	2	3	4	5
	dollars				
Gross receipts	222.97	298.96	129.60	162.50	94.50
Variable expenses a/	132.78	151.80	76.23	77.56	81.57
Balance	90.19	147.16	53.37	84.94	12.93
Fixed costs	41.09	48.37	45.53	45.77	38.31
Balance	49.10	98.79	7.84	39.17	-25.38

a/ If we do not allocate the variable expenses for general pickup truck use, with accompanying charges for driving hours, Social Security and interest, to crops as previously explained, variable expenses per acre are as follows:

Crop	1953	1955
Cotton	$127.96	$145.76
Alfalfa	73.66	74.30
Corn	--	80.14

TABLE 22

Gross Receipts, Costs, and Earnings by Crops and Total Farm, 160-acre Farm; 1955 and 1953

Item	Cotton lint	Cotton seed	Alfalfa	Field corn	Total farm
	1	2	3	4	5
1955					
Acres	54		55	25	134
Yield	1.6 bales a/	.68 tons b/	6.25 tons	35 cwt.	
Production	86.4 bales	36.72 tons	343.75 tons	875 cwt.	
Price	$167.30/bale	$46.00/ton	$26.00/ton	$2.70/cwt.	
	$14,454.72	$1,689.12			
Gross receipts	$16,143.84		$8,937.50	$ 2,362.50	$27,443.84
Costs (less land)	10,809.34		6,783.97	2,997.05	20,590.36
Receipts minus costs	$ 5,334.50		$2,153.53	$ -634.55	$ 6,853.48
Land interest ($400/acre c/ at 5%)	1,340.00		1,230.00	630.00	3,200.00
Net	$ 3,994.50		$ 923.53	$-1,264.55	$ 3,653.48
Add:					
Interest on fixed capital (incl. land)					4,100.45
Operator's labor d/					1,022.18
Net farm income					$ 8,776.11
Less:					
Operator's labor					2,500.00
Return to capital and management					$ 6,276.11
Rate earned on investment					7.65%
1953					
Acres	99		41		140
Yield	1.3 bales a/	.553 tons b/	6.0 tons		
Production	128.7 bales	54.70 tons	246 tons		
Price	$148.99/bale	$53.00/ton	$21.60/ton		
	$19,175.01	$2,899.10			
Gross receipts	$22,074.11		$5,313.60		$27,387.71
Costs (less land)	17,212.91		4,992.13		22,205.04
Receipts minus costs	$ 4,861.20		$ 321.47		$ 5,182.67
Land cost ($400/acre c/ at 5%)	2,180.00		1,020.00		3,200.00
Net	$ 2,681.20		$ -698.53		$ 1,982.67
Add:					
Interest on fixed capital (incl. land)					4,100.45
Operator's labor d/					1,165.75
Net farm income					$ 7,248.87
Less:					
Operator's labor					2,500.00
Return to capital and management					$ 4,748.87
Rate earned on investment					5.79%

a/ 500 lb. bales (lint: 478 lbs.; bagging and ties: 22 lbs.).

b/ 850 lbs. or 0.425 tons of seed per bale of lint.

c/ Bare land was valued at an arbitrary figure of $400 per acre. This value was estimated from available rental and assessment values and is the figure used for Grades I and II based on all farm models. We found it impossible to obtain a realistic current market value of land on the Eastside since property does not change hands frequently enough to suggest an average sale value. We do not present the $400 estimate as a precise market value. Readers should not interpret it as such.

d/ Includes total operator's labor used in producing crops and in establishing 1/4 of total alfalfa acreage.

Corn was the only enterprise which showed losses. However, corn did return enough gross receipts to cover variable expenses, and leave a balance of $12.93 per acre toward fixed costs. The per acre returns from cotton and alfalfa, after all costs are deducted, show a gain in 1955 over 1953 returns. [1]

Total receipts-minus-costs, excluding interest on land, were $5,183 in 1953 and $6,853 in 1955 (Figure 5). The 1955 increases in gross receipts more than offset the observed cost increases for cotton and alfalfa. The deduction from total receipts-minus-costs of the land cost, $3,200, left balances of $1,983 in 1953 and $3,653 in 1955. [2]

Net farm income on the 160-acre farm was $7,249 in 1953 and $8,776 in 1955. These were the amounts remaining to pay the operator for his labor and management and for the use of his capital. The 1955 net farm income reflected a lower total annual use of the operator's labor: 1,166 hours in 1953 and 1,022 hours in 1955.

After subtracting an imputed operator labor cost of $2,500 from net farm income in both years, $4,749 remain in 1953 and $6,276 in 1955 as returns to capital and management. The total labor that the operator provided in both years was below the estimated maximum 2,500 hours, which he could have worked during each year. This farm has positive rates earned on investment: 5.8 percent in 1953 and 7.6 percent in 1955. If the price changes between 1953 and 1955 had not occurred, the rate earned on investment in 1955 would have been 3.4 percent.

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[1] Gross receipts per acre from cotton were higher on the 160-acre farm than on the 80-acre unit due to higher cotton yields. Total fixed and total variable costs per acre for all crops on the 160-acre farm, on the other hand, were lower than those of the smaller farm. We make comparisons between farm organizations to emphasize characteristics of production, costs, and returns; we attempt no detailed analysis of underlying reasons for such variations.

[2] We remind the reader, as in the preceding section, that land values and interest rates used in this analysis are arbitrary and useful chiefly for comparing farms in the study.

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[illegible]

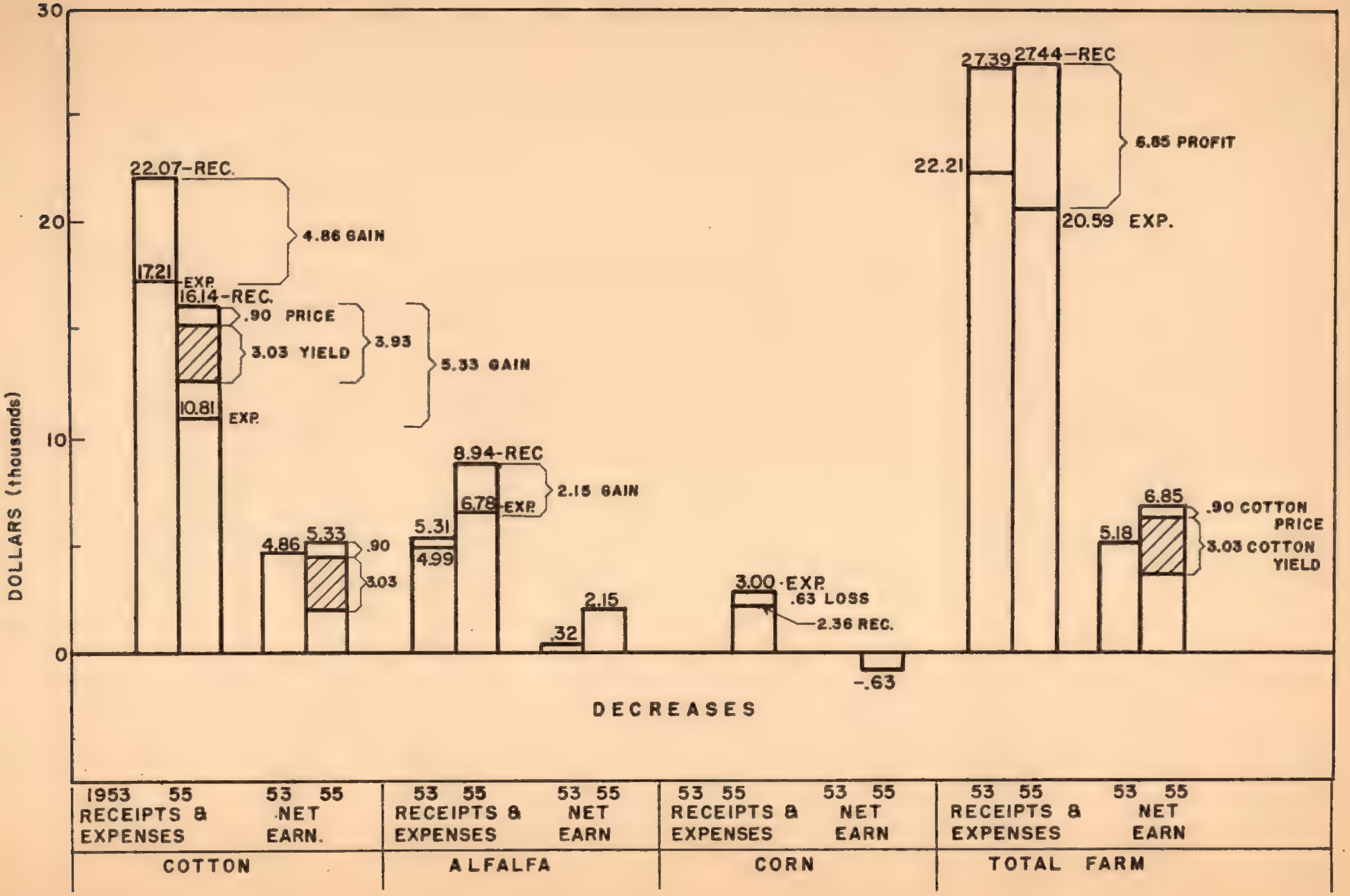
[illegible]

[illegible]

[illegible]

[illegible]

Figure 5. Changes in Gross Receipts, Expenses, and Net Returns on 160-acre Farm in San Joaquin Valley, Eastside, 1953-1955 (in thousands dollars)



Profits on the 160-acre farm increased from 1953 to 1955. Higher cotton yields and price gains for both cotton and alfalfa caused this profit increase; corn showed a loss in 1955.

Source: Calculated from survey data.

BOTH 320-ACRE FARMS SUFFERED PROFIT DECLINES IN 1955; CORN AND BARLEY SHOWED LOSSES ON DIVERTED ACRES

Investments and Fixed Costs Rose Slightly; Variable Expenses Declined From 1953 to 1955

We found two farm organizations necessary to represent changes in land use resulting from cotton allotments on 320-acre farms. Data for these "320-1" and "320-2" farms appear in this section. The two units had identical organizations in 1953, with no differences in investments, cropping plans or production inputs. Soil types and irrigation water supplies on the 320-1 farm also are the same as those on the 320-2 unit. The 1953 crop acreages were as follows: 183 acres of cotton, 87 acres of alfalfa, 10 acres of milo, and 20 idle acres (Table 8).

The two organizations differed in their adjustments to acreage allotments. In 1955 both farms reduced the size of the cotton enterprise by 83 acres, leaving 100 acres. The operator on the 320-1 unit planted 83 acres of corn and fallowed a total of 30 acres, while the 320-2 produced barley on 103 acres and fallowed only 10 acres. Both units eliminated milo in 1955, but maintained 87 acres of alfalfa.

The current investments of each 320-acre farm totaled $37,494 in 1953; these were as follows, excluding land:

Item	Investment (1955 prices)	Percent of total investment
Power	$14,090.00	37.6
Equipment 1/	12,422.50	33.1
Irrigation	10,859.20	29.0
Improvements	122.50	0.3
Total	$37,494.20	100.0
Per acre	117.17	

The new replacement costs of the farm's resources, excluding land, totaled $66,803 at 1955 prices. The total investments in 1955 were $37,856 for the

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1/ Includes $1,175 in standby equipment.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]

TABLE 23

Physical Resources and Investments for Typical 320-acre Farms, 1955 Prices

Item	Size or capacity	Amount	New cost		Average investment[a]	
			Per unit	Total	Per unit	Total
	1	2	3	4	5	6
			dollars			
Land:						
Total	320 acres					
Total cultivated	300 acres					
Improvements:						
Fuel storage - gas	350 gallons	1		110.00		55.00
Fuel storage - diesel	550 gallons	1		135.00		67.50
Subtotal				245.00		122.50
Irrigation system:						
Pumping plant	30 h.p.; 1,200 g.p.m.	3	3,000.00	9,000.00	1,537.50	4,612.50
Well, casing	16" diameter; 80' lift	3x250'	7.90	5,925.00	3.95	2,962.50
Pipe	16"	5,280'	1.00	5,280.00	.50	2,640.00
Stands	8' x 36"	3	72.00	216.00	18.00	108.00
Vents	8' x 8"	4	5.60	22.40	2.80	11.20
Alfalfa valves	10"	40	15.00	600.00	7.50	300.00
Siphons	3/4"-2"	300	1.50	450.00	.75	225.00
Subtotal				21,493.40		10,859.20
Power:						
Tracklayer	T-5D	1		7,000.00		3,850.00
Wheel tractor	W-1 (20-25 h.p.)	2	2,600.00	5,200.00	1,820.00	3,640.00
Wheel tractor	W-2 (25-35 h.p.)	2	3,000.00	6,000.00	2,100.00	4,200.00
Pickup truck	1/2 ton	2	2,000.00	4,000.00	1,200.00	2,400.00
Subtotal				22,200.00		14,090.00
Equipment:						
Ditcher	5'	1		140.00		70.00
Scraper	10'	1		520.00		260.00
Plow, 2 way	2-16"	1		550.00		275.00
Chisel	8'	1		525.00		262.50
Disk, offset	12'	1		1,050.00		525.00
Spiketooth harrow	4' section	6	30.00	180.00	15.00	90.00
Cultipacker	12'	1		380.00		190.00
Lister planter	4 row	1		550.00		275.00
Cultivator	4 row	1		1,000.00		500.00
Cotton picker	1 row	1		8,700.00		5,220.00
Cotton trailer	5 bale	6	400.00	2,400.00	220.00	1,320.00
Stalk cutter	2 row	1		325.00		162.50
Power mower	7'	1		350.00		175.00
Side delivery rake	8'	1		520.00		260.00
Hay baler	2 wire	1		3,325.00		1,662.50
Plow, disk b/	5 blade	1		1,400.00		700.00
Disk, tandem b/	8'	1		600.00		300.00
Cultivator b/	2 row	1		350.00		175.00
Subtotal				22,865.00		12,422.50
1953 Total, 320-1 and 320-2 farms				66,803.40		37,494.20
1955 Total, 320-1 farm c/				67,528.40		37,856.70
1955 Total, 320-2 farm d/				66,978.40		37,581.70

(Continued on next page.)

Table 23 Continued.

a/ $\dfrac{\text{New cost + Salvage value}}{2}$

No salvage values except as follows:

T-5D tractor: $700
W-1 tractors: $2,080 each
W-2 tractors: $2,400 each
Pickup trucks: $800 each
Cotton picker: $1,740
Cotton trailers: $240 each
Hay baler: $665

b/ Standby equipment owned but not used in 1953 or 1955.

c/ The 320-1 farm purchased one 8' offset disk in 1955 (new cost: $725.00; average investment: $362.50).

d/ The 320-2 farm purchased one border disk in 1955 (new cost: $175.00; average investment: $87.50).

320-1 farm and $37,582 for the 320-2 farm, both figures representing small gains over the 1953 total due to equipment purchases. In 1955 the 320-1 farm acquired an 8-foot offset disk, used to produce corn, while the 320-2 farm purchased a border disk for producing barley.

Power units included one tracklayer (T-5D), two W-1 and two W-2 tractors. These operators owned two 1/2-ton pickup trucks, a one-row cotton picker, and a two-wire hay baler. These latter two items, not found in the smaller-sized organization, accounted for $6,882 or 55 percent of the total equipment investment on the 320-acre farms in 1953. Other equipment items on these farms were comparable to those owned by the 160-acre operator, although the 320-acre farms had larger-sized disks, cultipackers, cotton trailers, ditchers, and scrapers; they also included an 8-foot chisel for preparing alfalfa land.

The 320-acre operators hired fewer contract services than those on the 80- and 160-acre farms because they owned additional seedbed and harvesting equipment. These operators, nevertheless, contracted harvesting for milo, corn, and barley, and alfalfa hay roadsiding. Contract operations on cotton included fertilizing, thinning, weeding, and dusting. The 320-acre farms rented one piece of equipment, the broadcaster, for alfalfa seeding on both organizations and for barley seeding in 1955 on the 320-2 farm.

These operators pumped irrigation water from three wells, each pumping plant having a capacity of 1,200 g.p.m. The distribution system included 5,280 feet of pipeline. Other improvements listed as investment items included gas and diesel fuel storage facilities.

The operations and physical inputs in producing cotton, alfalfa, and milo were the same on the 320-acre farms in both 1953 and 1955. As on the smaller-sized farms, fertilizer and irrigation water were the only physical inputs increased for cotton production in 1955. Operators applied 93 pounds of nitrogen equivalent per acre of cotton in 1953 and 114 pounds in 1955.

Water on cotton increased from 36 acre inches in 1953 to 38.4 acre inches in 1955. The 320-acre model farms had equal yields of cotton, alfalfa, and milo in 1953; the yields of cotton and alfalfa increased by equal amounts in 1955.

The total hours of labor that the operator furnished, consisting only of tractor and truck driving, were the same on the 320-1 and 320-2 farms in 1953 but differed in 1955. In 1953, total tractor and truck driving hours exceeded the estimated maximum time which the operator could contribute, i.e., 2,500 hours annually. The analysis assumes that all driving above this maximum of 2,500 hours was performed by hired laborers who received the same wage, $1.00 per hour, charged to crops for the operator's labor. This treatment of the labor input is a bookkeeping step rather than a description of actual practice; the operators of 320-acre cotton farms often hire a man on a year-round basis when annual labor requirements exceed the hours of operator availability by a wide margin. In practice, most operators would prefer a permanent employee to seasonal labor since the problems of labor availability and ill-treatment of expensive machinery potentially confront the operator who relies upon temporary help.

Changed Cropping System Brought Different Cost Allocations

The input costs and allocated production costs for the 320-acre farms were identical in 1953. Per acre and total costs for the two farms differed in 1955 because of the difference in cropping plans. This experience on farms of the 320-acre size permits us to compare the effects on costs, receipts, and earnings of two different land use adjustments. In the analysis of the 80-acre and 160-acre farms we focused attention on comparing costs, receipts, and earnings for a given model farm between 1953 and 1955. The 320-acre analysis not only applies the same comparison between pre-allotment and post-allotment years for each 320-acre farm, but also permits us to compare possible adjustments which the same operator might choose.

Dissimilar Crop Adjustments Meant Different Fixed Cost Distribution in 1955 on the 320-1 and 320-2 Farms

Real estate taxes, office costs, and improvements.--Both farms had 40 fallow and noncultivated acres in 1953. We allocated real estate taxes as before on an acreage-weighted basis. [1] In 1955 nonproducing land consisted of 50 acres on the 320-1 farm and 30 acres on the 320-2 unit. We spread the same total tax cost for the 320-acre farm, $2,080, over 270 producing acres on the 320-1 farm and over 290 producing acres on the 320-2 unit.

Office costs for the 320-acre farms were $300, while improvement costs totaled $30.63, annually. The amount of fallow acreage in 1955 led to increased per acre charges for these items on the 320-1 but decreased per acre charges on the 320-2 farm. [2]

Power and equipment.--There was no difference in power and equipment requirements, either per acre or total, between the two 320-acre farms in

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[1] The tax cost by crops is as follows:

Crop	Acres	% of total producing acres	Total tax cost ($)	Per acre tax cost ($)
	1	2	3	4
		320-1 and 320-2 farms		
1953				
Cotton	183	65	1,352.00	7.39
Alfalfa	87	31	644.80	7.41
Milo	10	4	83.20	8.32
	280	100	2,080.00	
		320-1 farm		
1955				
Cotton	100	37	769.60	7.70
Alfalfa	87	32	665.60	7.65
Corn	83	31	644.80	7.77
	270	100	2,080.00	
		320-2 farm		
1955				
Cotton	100	34	707.20	7.07
Alfalfa	87	30	624.00	7.17
Barley	103	36	748.80	7.27
	290	100	2,080.00	

[2] We allocated office costs by multiplying the crop acreage percentages listed in the preceding footnote by the total office cost for the farm. The same procedure applies to improvement costs, including depreciation, $24.50, and interest, $6.13.

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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1953 (Tables 24 and 25). Cotton and alfalfa requirements are also the same for the two farms in 1955. However, the total hours of use for many of the power and equipment items differed in 1955 from the earlier year. Total producing acres were not the same on these farms in 1955, and the two alternative crops, corn on the 320-1 and barley on the 320-2, had dissimilar power and equipment requirements. The 320-1 farm had a decline between 1953 and 1955 in total use for all items except the W-1 tractor and alfalfa harvesting equipment. Total alfalfa equipment use remained constant inasmuch as the alfalfa acreage did not change. The same effects of land use changes appeared on the 320-2 farm, although the hours of W-1 use increased; barley production required this tractor in 1955. With the exception of the W-1 tractor, and specialized cotton and alfalfa equipment, the 320-2 farm used power and equipment items less completely in 1955 than the 320-1 unit. The 103 acres of barley required fewer operations and less tractor and equipment time than 83 acres of corn.

Total power and equipment fixed costs, $7,714, were the same for both farms in 1953, but increased by different amounts with equipment purchased in 1955 (Table 26). The fixed cost total for equipment on these farms in 1953 was over three times that of the 160-acre farm. The cotton picker on the 320-acre farms accounted for about 44 percent of the total equipment overhead; the total fixed cost of the hay baler was approximately 15 percent of this total.

Fixed costs per hour for most tractor and equipment items show a greater increase in 1955 over 1953 for the 320-2 than for the 320-1 farm (Table 28). The changes in unit fixed costs for the cotton picker, cotton trailers, the cultipacker, and stalk cutter, however, were the same for both farms. The fixed costs per hour of the cotton picker increased from about $3.59 in 1953 to $6.58 in 1955, due to reduced use.

TABLE 24

Annual Power and Equipment Hours, 320-1 Farm; 1953 and 1955

	Cotton			Alfalfa			Milo		Corn		All crop total	
		total			total			total		total		
Item	per acre	1953 (183 acre)	1955 (100 acre)	per acre	1953 (87 acre)	1955 (87 acre)	per acre	1953 (10 acre)	per acre	1955 (83 acre)	1953	1955
	1	2	3	4	5	6	7	8	9	10	11	12
Power:												
T-5D tractor	2.53	462.99	253.00	.55	47.85	47.85	2.47	24.70	2.52	209.16	535.54	510.01
W-1 tractor				3.66	318.42	318.42					318.42	318.42
W-2 tractor	5.65	1033.95	565.00	2.38	207.06	207.06	1.62	16.20	2.23	185.09	1257.21	957.15
Pickup truck											(24,000 miles)	
Equipment:												
5' ditcher	.20	36.60	20.00				.15	1.50	.15	12.45	38.10	32.45
10' scraper	.20	36.60	20.00				.15	1.50	.15	12.45	38.10	32.45
Plow, 2w/2-16"	.75	137.25	75.00				.75	7.50	.75	62.25	144.75	137.25
8' chisel				.28	24.36	24.36					24.36	24.36
8' offset disk									.35	29.05		29.05
12' offset disk	1.38	252.54	138.00	.27	23.49	23.49	1.12	11.20	1.12	92.96	287.23	254.45
16' spiketooth harrow	.60	109.80	60.00	.12	10.44	10.44	.60	6.00	.60	49.80	126.24[a]	120.24[a]
12' cultipacker	.20	36.60	20.00								36.60	20.00
4-row lister planter	.61	111.63	61.00				.61	6.10	.61	50.63	117.73	111.63
4-row cultivator	1.56	285.48	156.00				1.31	13.10	1.62	134.46	298.58	290.46
1-row cotton picker	2.78	508.74	278.00								508.74	278.00
5-bale cotton trailer	1.50	274.50	150.00								274.50	150.00
2-row stalk cutter	.50	91.50	50.00								91.50	50.00
7' power mower				1.86	161.82	161.82					161.82	161.82
8' side delivery rake				1.74	151.38	151.38					151.38	151.38
2-wire hay baler				2.34	203.58	203.58					203.58	203.58

a/ Total annual hours of six 4-foot sections = 2/3 of 16' spiketooth harrow hours.

TABLE 25

Annual Power and Equipment Hours, 320-2 Farm; 1953 and 1955

Items	Cotton			Alfalfa			Milo		Barley		All crop total	
		total			total			total		total		
	per acre	1953 (183 acre)	1955 (100 acre)	per acre	1953 (87 acre)	1955 (87 acre)	per acre	1953 (10 acre)	per acre	1955 (103 acre)	1953	1955
	1	2	3	4	5	6	7	8	9	10	11	12
Power:												
T-5D tractor	2.53	462.99	253.00	.55	47.85	47.85	2.47	24.70	.71	73.13	535.54	373.98
W-1 tractor				3.66	318.42	318.42			.22	22.66	318.42	341.08
W-2 tractor	5.65	1033.95	565.00	2.38	207.06	207.06	1.62	16.20	.22	22.66	1257.21	794.72
Pickup truck											(24,000 miles)	
Equipment:												
5' ditcher	.20	36.60	20.00				.15	1.50			38.10	20.00
10' scraper	.20	36.60	20.00				.15	1.50			38.10	20.00
Plow, 2w/2-16"	.75	137.25	75.00				.75	7.50			144.75	75.00
8' chisel				.28	24.36	24.36					24.36	24.36
12' offset disk	1.38	252.54	138.00	.27	23.49	23.49	1.12	11.20	.56	57.68	287.23	219.17
Border disk									.22	22.66		22.66
16' spiketooth harrow	.60	109.80	60.00	.12	10.44	10.44	.60	6.00	.30	30.90		
20' spiketooth harrow									.15	15.45	84.16[a]	80.44[a]
12' cultipacker	.20	36.60	20.00								36.60	20.00
4-row lister planter	.61	111.63	61.00				.61	6.10			117.73	61.00
4-row cultivator	1.56	285.48	156.00				1.31	13.10			298.58	156.00
1-row cotton picker	2.78	508.74	278.00								508.74	278.00
5-bale cotton trailer	1.50	274.50	150.00								274.50	150.00
2-row stalk cutter	.50	91.50	50.00								91.50	50.00
7' power mower				1.86	161.82	161.82					161.82	161.82
8' side delivery rake				1.74	151.38	151.38					151.38	151.38
2-wire hay baler				2.34	203.58	203.58					203.58	203.58

[a] Total annual hours of six 4-foot sections = 2/3 of 16' spiketooth harrow hours plus 5/6 of 20' spiketooth harrow hours.

Standby equipment on these farms incurred fixed costs which were allocated to crops as follows:

Item	Fixed cost charged to:
Plow, 5 blade disk	All crops, except milo
8' tandem disk	All crops
2-row cultivator	Cotton, corn, and milo

Operations on each 320-acre farm required a total of 24,000 miles for the two 1/2-ton pickup trucks. We allocated this mileage so that cotton and alfalfa acres carried the cost of more truck miles in 1955 than in 1953, hence a slight addition to per acre fixed costs for these crops.

Irrigation water.--The 320-acre farms pumped 940 acre feet of water in 1953 (Figure 6). Total water usage increased to 960 acre feet in 1955 on the 320-1 farm, in spite of irrigated acres dropping from 280 to 270 acres. Allotments reduced the cotton enterprise to 100 acres in 1955, but the operator planted 83 acres to corn in that year. The corn water requirements, 39 acre inches per acre, were slightly higher than cotton's. Increased cotton water application accounted for the remaining total pumping increase. On the 320-2 farm, total water usage in 1955 declined to 793 acre feet, in spite of an increase in total irrigated acreage. This was because barley requires only 12 acre inches of water per acre, about one-third the amount for cotton and corn. Per acre applications of water for alfalfa acres were the same as those on the smaller-sized farms, i.e., 51 acre inches per acre.

The fixed costs of irrigation water totaled $2,094 in both years (Table 26). The total fixed cost per acre foot of water was $2.23 on both farms in 1953, but decreased to $2.18 on the 320-1 and increased to $2.64 on the 320-2 farm in 1955 (Table 28).

The cost of establishing a stand of alfalfa.--The 320-acre farm operator charged his alfalfa crop with a cost of $1,005 for establishing alfalfa in 1953 or about $12 per acre. This fixed cost item increased to $1,012 on the 320-1 and [illegible] increased fixed costs [illegible]

[illegible] crops [illegible]

[illegible]	Crops grown
[illegible]	All crops, except milo
[illegible]	All crops
[illegible]	Cotton, corn, and milo

[illegible] farm [illegible] a total of [illegible] 1,600 acre-[illegible] [illegible] this [illegible] first [illegible]

[illegible] a slight [illegible] to [illegible] for these [illegible].

[illegible] (40) acre-feet of water [illegible]

[illegible] 40 acre-feet [illegible]

[illegible] from 250 to 270 [illegible].

[illegible] to 7 acres in [illegible]

[illegible] requirements [illegible]

[illegible] cotton [illegible] increased [illegible]

[illegible] on the [illegible]

[illegible] to [illegible], to [illegible]

[illegible]

[illegible] for cotton and [illegible]

[illegible] water for [illegible]

[illegible], i.e., [illegible] acre.

[illegible] in both [illegible]

[illegible] total fixed costs [illegible] water supply [illegible] on both [illegible]

[illegible] on the [illegible]

[illegible]

[illegible] 320-acre farm [illegible]

[illegible]

[illegible]

TABLE 26

Fixed Costs: Power, Equipment, and Irrigation Water, 320-acre Farms; 1953 and 1955

Item	Original cost	Life	Salvage value	Average investment a/	Annual noncash costs			Annual cash costs	Total fixed costs
					depr. b/	int. c/	total	taxes & insur. d/	
	1	2	3	4	5	6	7	8	9
Power:									
T-5D tractor	7000	10	700	3850	630.00	192.50	822.50	128.33	950.83
W-1 tractor (2)	5200	6	2080	3640	520.00	182.00	702.00	121.33	823.33
W-2 tractor (2)	6000	6	2400	4200	600.00	210.00	810.00	140.00	950.00
Pickup truck (2)	4000	5	800	2400	640.00	120.00	760.00	107.99 e/	867.99
Subtotal							3,094.50	497.65	3,592.15
Equipment:									
5' ditcher	140	10		70	14.00	3.50	17.50	1.75	19.25
10' scraper	520	10		260	52.00	13.00	65.00	6.50	71.50
Plow, 2w/2-16"	550	10		275	55.00	13.75	68.75	6.88	75.63
8' chisel	525	10		263	52.50	13.15	65.65	6.58	72.23
12' offset disk	1050	10		525	105.00	26.25	131.25	13.12	144.37
Spiketooth harrow (6)	180	15		90	12.00	4.50	16.50	2.25	18.75
12' cultipacker	380	10		190	38.00	9.50	47.50	4.75	52.25
4-row lister planter	550	10		275	55.00	13.75	68.75	6.88	75.63
4-row cultivator	1000	10		500	100.00	25.00	125.00	12.50	137.50
1-row cotton picker	8700	5	1740	5220	1,392.00	261.00	1,653.00	174.00	1,827.00
5-bale cotton trailer (6)	2400	5	240	1320	432.00	66.00	498.00	33.00	531.00
2-row stalk cutter	325	10		163	32.50	8.15	40.65	4.08	44.73
7' power mower	350	10		175	35.00	8.75	43.75	4.38	48.13
8' side delivery rake	520	10		260	52.00	13.00	65.00	6.50	71.50
2-wire hay baler	3325	6	665	1995	433.33	99.75	543.08	66.50	609.58
Plow, 5 blade disk f/	1400	10		700	140.00	35.00	175.00	17.50	192.50
8' tandem disk f/	600	10		300	60.00	15.00	75.00	7.50	82.50
2-row cultivator f/	350	10		175	35.00	8.75	43.75	4.38	48.13
Subtotal							3,743.13	379.05	4,122.18

(Continued on next page.)

Table 26 Continued.

Item	Original cost	Life	Salvage value	Average invest-ment a/	Annual noncash costs			Annual cash costs	Total fixed costs
					depr. b/	int. c/	total	taxes & insur. d/	
	1	2	3	4	5	6	7	8	9
Irrigation water:									
Pumping plant	9000	20	225	4613	438.75	230.65	669.40	221.89	891.29
Well & casing	5925	20		2963	296.25	148.15	444.40	142.52	586.92
Pipeline	5518	30		2759	183.95	137.95	321.90	132.71	454.61
Alfalfa valves	600	30		300	20.00	15.00	35.00	14.43	49.43
Siphons	450	5		225	90.00	11.25	101.25	10.82	112.07
Subtotal							1,571.95	522.37	2,094.32
1953 Total fixed costs, all items							8,409.58	1399.07	9,808.65
1955 Additions to inventory:									
320-1: 8' offset disk	725	10		363	72.50	18.15	90.65	9.08	99.73
320-1: 1955 Total fixed costs, all items							8,500.23	1408.15	9,908.38
320-2: Border disk	175	10		88	17.50	4.40	21.90	2.20	24.10
320-2: 1955 Total fixed costs, all items							8,431.48	1410.35	9,932.48

a/ $\frac{\text{Original cost + Salvage value}}{2}$

b/ $\frac{\text{Original cost - Salvage value}}{\text{Life}}$

c/ 5 percent x average investment.

d/ 3.3333 percent x average investment (power)
2.5 percent x average investment (equipment)
4.81 percent x average investment (irrigation system)

e/ Includes $50 license and $50 insurance.

f/ Standby equipment.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

TABLE 27

Variable Expenses: Power, Equipment, and Irrigation Water, 320-acre Farms; 1953 and 1955

	1953			1955					
	320-1 and 320-2 Farms			320-1 Farm			320-2 Farm		
Item	fuel & lube a/	repairs	total	fuel & lube a/	repairs	total	fuel & lube a/	repairs	total
	1	2	3	4	5	6	7	8	9
Power:									
T-5D tractor	267.77	225.00	492.77	255.01	225.00	480.01	186.99	225.00	411.99
W-1 tractor (2)	127.37	120.00	247.37	127.37	120.00	247.37	136.43	120.00	256.43
W-2 tractor (2)	754.33	330.00	1,084.33	574.29	200.00	774.29	476.83	200.00	676.83
Pickup truck (2)	600.00	200.00	800.00	600.00	200.00	800.00	600.00	200.00	800.00
Subtotal			2,624.47			2,301.67			2,145.25
Equipment:									
5' ditcher		4.20	4.20		4.20	4.20		4.20	4.20
10' scraper		15.60	15.60		15.60	15.60		15.60	15.60
Plow, 2w/2-16"		82.50	82.50		82.50	82.50		82.50	82.50
8' chisel		52.50	52.50		52.50	52.50		52.50	52.50
8' offset disk					108.75	108.75			
12' offset disk		157.50	157.50		157.50	157.50		157.50	157.50
Border disk								17.50	17.50
Spiketooth harrow (6)		3.60	3.60		3.60	3.60		3.60	3.60
12' cultipacker		38.00	38.00		38.00	38.00		38.00	38.00
4-row lister planter		55.00	55.00		55.00	55.00		55.00	55.00
4-row cultivator		200.00	200.00		200.00	200.00		200.00	200.00
1-row cotton picker		1,455.00	1,455.00		1,455.00	1,455.00		1,455.00	1,455.00
5-bale cotton trailer (6)		72.00	72.00		72.00	72.00		72.00	72.00
2-row stalk cutter		16.25	16.25		16.25	16.25		16.25	16.25
7' power mower		35.00	35.00		35.00	35.00		35.00	35.00
8' side delivery rake		52.00	52.00		52.00	52.00		52.00	52.00
2-wire hay baler		166.25	166.25		166.25	166.25		166.25	166.25
Subtotal			2,405.40			2,514.15			2,422.90

(Continued on next page.)

Table 27 Continued.

Item	1953			1955					
	320-1 and 320-2 Farms			320-1 Farm			320-2 Farm		
	lube & power b/	repairs	total	lube & power b/	repairs	total	lube & power b/	repairs	total
	1	2	3	4	5	6	7	8	9
Irrigation water:									
Pumping plant	2,332.05	180.00	2,512.05	2,357.76	180.00	2,537.76	2,136.06	180.00	2,316.06
Pipeline		27.59	27.59		27.59	27.59		27.59	27.59
Alfalfa valves		3.00	3.00		3.00	3.00		3.00	3.00
Subtotal			2,542.64		——	2,568.35			2,346.65
Total variable cost, all items			7,572.51			7,384.17			6,914.80

a/ T-5D: \$ .50 per hour W-2: \$ .60 per hour
W-1: \$ .40 per hour Pickup: \$ .025 per mile

b/ Power and lube costs obtained as follows (per pump):
Power cost = sum of following charges:
(1) Service charge (\$192 for 30 h.p. motor)
(2) First 1,000 kw-hrs @ \$ .014 per h.p.
(3) Second 1,000 kw-hrs @ \$ .0085 per h.p.
(4) Remaining kw-hrs @ \$ .006 per h.p.
Lube cost = 1 percent of power cost.

$$\text{Kw-hrs} = \frac{\text{Rated h.p. x 100 x .746 x hrs. pumped}}{\text{Motor efficiency}}$$

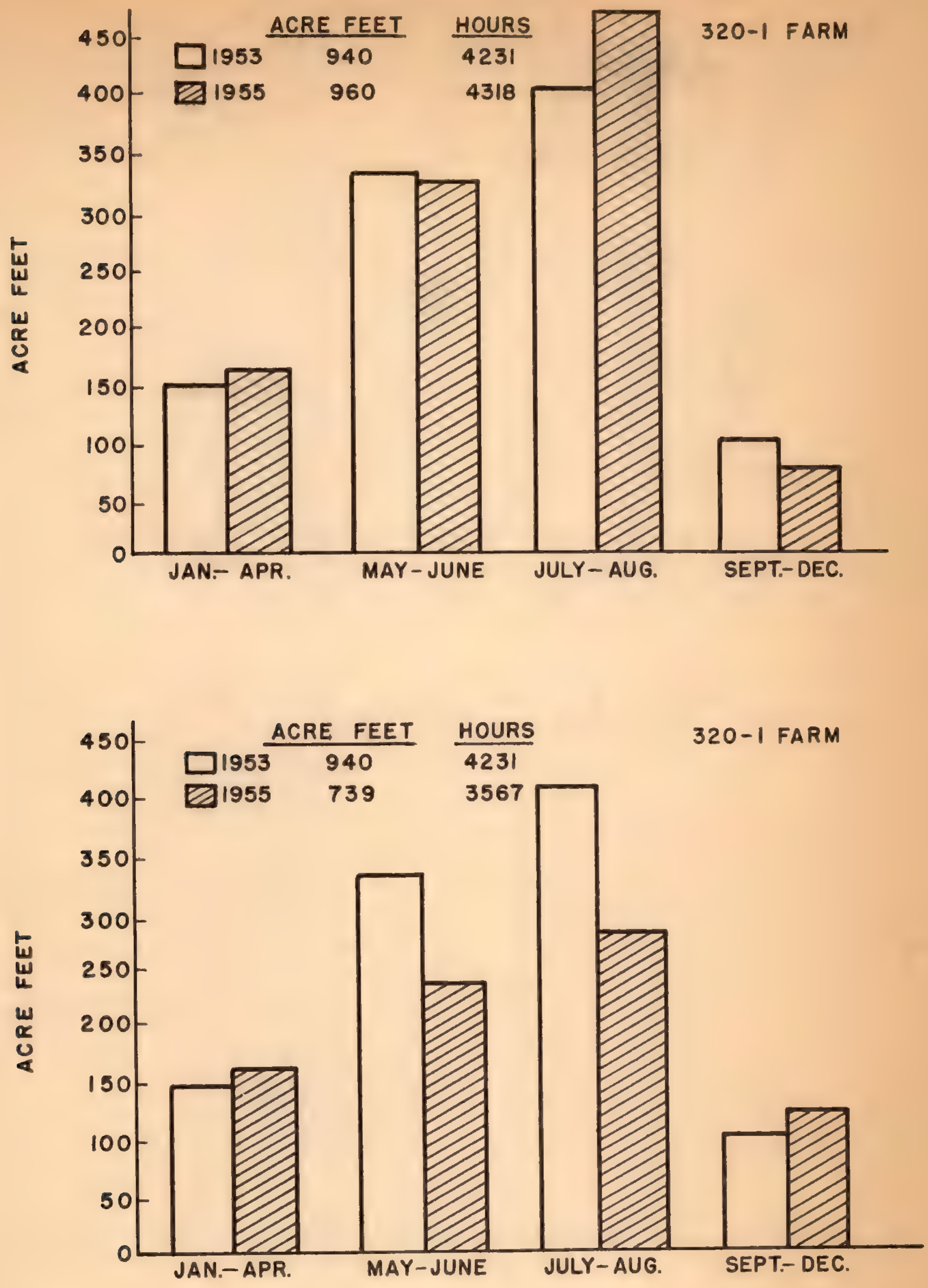
TABLE 28

Unit Costs [a]: Power, Equipment, and Irrigation Water, 320-acre Farms; 1953 and 1955

Item	Unit	Fixed cost per unit		Variable expenses per unit		Total cost per unit	
		1953	1955	1953	1955	1953	1955
	1	2	3	4	5	6	7
320-1							
Power:							
T-5D tractor	hour	1.78	1.87	.92	.94	2.70	2.81
W-1 tractor (2)	hour	2.58	2.58	.78	.78	3.36	3.36
W-2 tractor (2)	hour	.76	.99	.86	.81	1.62	1.80
Pickup truck (2)	mile	.04	.04	.03	.03	.07	.07
Equipment:							
5' ditcher	hour	.51	.59	.11	.13	.62	.72
10' scraper	hour	1.88	2.20	.41	.48	2.29	2.68
Plow, 2w/2-16"	hour	.52	.55	.57	.60	1.09	1.15
8' chisel	hour	2.96	2.96	2.16	2.16	5.12	5.12
8' offset disk	hour		3.44		3.74		7.18
12' offset disk	hour	.50	.57	.55	.62	1.05	1.19
Spiketooth harrow (6)	hour	.08	.08	.04	.04	.12	.12
12' cultipacker	hour	1.43	2.61	1.04	1.90	2.47	4.51
4-row lister planter	hour	.64	.68	.47	.49	1.11	1.17
4-row cultivator	hour	.46	.47	.67	.69	1.13	1.16
1-row cotton picker	hour	3.59	6.58	2.86	5.23	6.45	11.81
5-bale cotton trailer (6)	hour	1.94	3.54	.26	.48	2.20	4.02
2-row stalk cutter	hour	.49	.90	.18	.32	.67	1.22
7' power mower	hour	.29	.29	.22	.22	.51	.51
8' side delivery rake	hour	.48	.48	.34	.34	.82	.82
2-wire hay baler	hour	2.99	2.99	.82	.82	3.81	3.81
Irrigation water:	acre foot	2.23	2.18	2.70	2.68	4.93	4.86
320-2							
Power:							
T-5D tractor	hour	1.78	2.54	.92	1.10	2.70	3.64
W-1 tractor (2)	hour	2.58	2.42	.78	.75	3.36	3.17
W-2 tractor (2)	hour	.76	1.20	.86	.85	1.62	2.05
Pickup truck (2)	mile	.04	.04	.03	.03	.07	.07
Equipment:							
5' ditcher	hour	.51	.96	.11	.21	.62	1.17
10' scraper	hour	1.88	3.58	.41	.78	2.29	4.36
Plow, 2w/2-16"	hour	.52	1.01	.57	1.10	1.09	2.11
8' chisel	hour	2.96	2.96	2.16	2.16	5.12	5.12
12' offset disk	hour	.50	.66	.55	.72	1.05	1.38
Border disk	hour		1.07		.77		1.84
Spiketooth harrow (6)	hour	.23	.24	.04	.04	.27	.28
12' cultipacker	hour	1.43	2.61	1.04	1.90	2.47	4.51
4-row lister planter	hour	.64	1.24	.47	.90	1.11	2.14
4-row cultivator	hour	.46	.88	.67	1.28	1.13	2.16
1-row cotton picker	hour	3.59	6.58	2.86	5.23	6.45	11.81
5-bale cotton trailer (6)	hour	1.94	3.54	.26	.48	2.20	4.02
2-row stalk cutter	hour	.49	.90	.18	.32	.67	1.22
7' power mower	hour	.29	.29	.22	.22	.51	.51
8' side delivery rake	hour	.48	.48	.34	.34	.82	.82
2-wire hay baler	hour	2.99	2.99	.82	.82	3.81	3.81
Irrigation water:	acre foot	2.23	2.64	2.70	2.96	4.93	5.60

[a] Rounded.

Figure 6. Irrigation Water Use, 320-acre Farms; 1953 and 1955.



Total irrigation water use and pumping hours increased from 1953 to 1955 for the 320-1 farm, but decreased sharply for the 320-2 farm.

Source: Calculated from survey data.

to $1,069 on the 320-2 farm in 1955. The rise was due, not to an increase in alfalfa acreage, but rather to increased unit costs of several power and equipment items. The cost per acre foot of irrigation water also increased on the 320-2 farm. On the other hand, a decrease in the unit cost of water occurred on the 320-1 farm, but this reduction was not large enough to offset the higher costs of power and equipment. The primary cost increase responsible for the higher total establishment cost was that of the T-5D tractor.

Variable Expenses Dropped in 1955 Because Grains Used Smaller Inputs Than Cotton

Power and equipment.--Repair expenses for W-2 tractors were the only ones which changed between 1953 and 1955. This item was $330 for the W-2 tractors on each farm in 1953, but declined to $200 in 1955 due to a drop in total annual use (Table 27). The total variable expenses for the T-5D and W-2 tractors decreased more on the 320-2 than on the 320-1 farm, whereas W-1 variable expenses increased on the 320-2. The cotton picker was responsible for about 60 percent of the total equipment variable expense in 1953. As on the smaller-sized farms, variable expenses were not unlike fixed costs, particularly equipment expenses which consisted only of repairs.

Materials.--The total variable expenses for irrigation water increased between 1953 and 1955 on the 320-1, but decreased on the 320-2 farm (Table 27). The relationship between cost and use found on the smaller-sized farms also appeared on the 320-acre farms. Changes in total annual pumping of water did not bring corresponding relative changes in total variable expenses. This item decreased on the 320-1 from $2.70 per acre foot of water in 1953 to $2.68 in 1955, while on the 320-2 farm it increased from $2.70 to $2.96 (Table 28).

Labor.--Operators on the 320-acre farms used a total of 2,962 tractor and truck driving hours in 1953. We assumed that the operator accounted for 2,500 hours and that he hired outside labor for the remaining 462 hours.

[illegible] that ratio to [illegible]

[illegible] the rest [illegible] per foot of irrigation water [illegible]

or the Snake [illegible] the other [illegible] in [illegible]

[illegible] this assumption [illegible]

[illegible] total establishment costs [illegible]

[illegible]

[illegible] Ill.—[illegible] expenditures for [illegible] structures [illegible] between 1903 and 1925. [illegible]

[illegible] on the [illegible]

[illegible] in the [illegible]

[illegible] the total cost [illegible]

[illegible] ex[illegible]

[illegible]

[illegible] various [illegible] expenditures [illegible]

[illegible] the 570-1, [illegible]

[illegible] establishment [illegible]

[illegible] the [illegible]

[illegible] corresponding [illegible]

[illegible] the 500-1 from 5.70 [illegible]

[illegible] on the 3-0-2 [illegible] to [illegible]

[illegible] Operations on the [illegible]

[illegible] that the [illegible]

[illegible] that [illegible]

The distinction between operator's labor and off-farm help is unimportant in determining crop input costs because both appear as variable expenses. Operator's labor is significant, however, in the following treatment of earnings.

In 1955 total driving hours were 2,521 on the 320-1, and 2,246 on the 320-2 farm. These totals again exceed the maximum available operator's labor time for any one year on the 320-1 unit, but driving requirements were below this estimated maximum on the 320-2 farm. Reduced cotton acreage caused a decrease in driving hours, and on neither farm did adjustments, considered as a package, bring total driving requirements up to those of 1953. More driving time was required on the 320-acre farms, partly because cotton and alfalfa harvesting equipment was owned. On the smaller farms where all harvesting was contracted, driving time was lower than on the 320-acre farms. When cotton acres decreased on the 320-acre unit, the decreased use of operator labor was more noticeable than on the smaller farms.

The total variable expense for irrigator labor on the 320-1 farm increased in 1955 with the increase in total water application; the opposite occurred on the 320-2 farm.

Contract services.--Unit costs of contract services were the same as on the 80-acre and 160-acre farms. These costs accounted for about 45 percent of the total variable expenses in producing cotton during 1953.[1]

Alfalfa hay roadsiding was the only contract operation in alfalfa production, and accounted for about 18 percent of total variable expenses. Contract services used to produce other crops accounted for the following percentages of their respective total variable costs: milo, 27 percent; corn, 42 percent; and barley, 36 percent.

Cotton yields increased on both farms from 1.3 bales per acre in 1953 to 1.4 in 1955. Alfalfa hay yielded 6.0 tons per acre in 1953 and 6.25 tons

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[1] Contract costs were about 60 percent of total variable costs for cotton on the smaller-sized farms which contracted cotton picking.

per acre in 1955, the same yields used in the analysis of the 80- and 160-acre organizations.

Cotton Reductions and Lower Inputs for Alternative Crops Caused Reduced Total Costs in 1955

Total fixed costs (except alfalfa establishing costs) for each farm model were as follows in 1953:

Item	Total fixed cost
Power	$ 3,592.15
Equipment	4,122.18
Irrigation system	2,094.32
Real estate taxes	2,080.00
Office expenses	300.00
Improvements	30.63
Total	$12,219.28
Per acre	38.19

The fixed cost totals were $13,146 on the 320-1 farm, and $13,178 on the 320-2 in 1955. The difference reflects new equipment purchased in the latter year.

The total per acre variable expenses in producing cotton and alfalfa increased between 1953 and 1955 on both farms; no cost comparisons are possible for milo, corn, or barley (Table 29). The sum of variable expenses for the total farm, however, was lower in 1955 than in 1953 for both organizations. The 320-2 farm had a smaller variable expense total than the 320-1 in 1955; barley production costs were less than one-half corn production costs per acre.

The foregoing description indicates that adjustments on both models affected power, equipment, and irrigation facility use and, therefore, production costs. The per acre costs of these items changed in 1955, but not necessarily in the same direction. For example, planting barley on the 320-2 farm increased the average cost of an acre foot of water but decreased the cost per hour of W-1 use; the opposite changes in costs of these items occurred on the 320-1 farm. The total cost picture is more significant than the changes in costs of individual items in affecting total farm earnings.

TABLE 29

Input Costs by Crops and Total Farm, 320-acre Farms; 1955 and 1953

320-1: 1955

Item	Cotton (100 acres)		Alfalfa (87 acres)		Field corn (83 acres)		Total farm
	per acre	total	per acre	total	per acre	total	
	1	2	3	4	5	6	7
Fixed:	59.76	5,975.93	53.22	4,630.85	30.59	2,539.27	13,146.05
Variable:							
Power	11.23	1,123.00	6.83	594.21	6.31	523.73	2,240.94
Equipment	18.63	1,863.00	2.91	253.17	3.98	330.34	2,446.51
Materials	10.96	1,096.00	14.49	1,260.63	11.30	937.90	3,294.53
Labor	27.53	2,752.92	26.23	2,281.82	20.98	1,741.35	6,776.09
Contracts	56.04	5,604.02	10.94	951.78	33.84	2,808.57	9,364.37
Total variable	124.39	12,438.94	61.40	5,341.61	76.41	6,341.89	24,122.44
Total cost	184.15	18,414.87	114.62	9,972.46	107.00	8,881.16	37,268.49

320-2: 1955

Item	Cotton (100 acres)		Alfalfa (87 acres)		Barley (103 acres)		Total farm
	per acre	total	per acre	total	per acre	total	
	1	2	3	4	5	6	7
Fixed:	65.37	6,537.61	55.19	4,802.10	17.85	1,838.09	13,177.80
Variable:							
Power	11.65	1,165.00	6.73	585.51	3.17	326.51	2,077.02
Equipment	20.39	2,039.00	2.91	253.17	.65	66.95	2,359.12
Materials	11.88	1,188.00	15.72	1,367.64	6.56	675.68	3,231.32
Labor	27.36	2,735.99	26.14	2,274.46	7.34	756.28	5,766.73
Contracts	56.12	5,611.67	10.94	951.78	12.01	1,236.96	7,800.41
Total variable	127.40	12,739.66	62.44	5,432.56	29.73	3,062.38	21,234.60
Total cost	192.77	19,277.27	117.63	10,234.66	47.58	4,900.47	34,412.40

320-1 and 320-2: 1953

Item	Cotton (183 acres)		Alfalfa (87 acres)		Milo (10 acres)		Total farm
	per acre	total	per acre	total	per acre	total	
	1	2	3	4	5	6	7
Fixed:	45.98	8,412.94	52.32	4,551.94	25.20	252.02	13,216.90
Variable:							
Power	10.63	1,945.29	6.53	568.11	5.38	53.80	2,567.20
Equipment	11.27	2,062.41	2.91	253.17	2.30	23.00	2,338.58
Materials	10.50	1,921.50	14.48	1,259.76	6.60	66.00	3,247.26
Labor	25.99	4,757.10	25.89	2,252.37	15.23	152.25	7,161.72
Contracts	51.95	9,506.69	10.50	913.50	13.77	137.74	10,557.93
Total variable	110.34	20,192.99	60.31	5,246.91	43.28	432.79	25,872.69
Total cost	156.32	28,605.93	112.63	9,798.85	68.48	684.81	39,089.59

Total Farm Profits Dropped Because Higher Cotton and Alfalfa Profits Per Acre Failed to Offset Losses on Diverted Acres

Total gross receipts were $52,738 in 1953 for both the 320-1 and 320-2 farms. Following the cropping adjustments that occurred in 1955, total gross receipts declined to $48,140 on the 320-1 and to $45,390 on the 320-2 farm (Table 30). This was despite yield and price increases for cotton and alfalfa. If no yield and price changes had occurred between 1953 and 1955, gross receipts would have been $41,416 on the 320-1, and $38,666 on the 320-2 farm. These figures represent reductions of $6,724 from the observed 1955 gross receipts on each farm. The gross receipts which might have been recorded for these farms in 1955 if different yield and price changes had occurred are shown in the following text table:

Conditions	Gross receipts in 1955 a/		Reduction from observed gross receipts
	320-1	320-2	
	1	2	3
	dollars		
Observed change in YIELD and PRICE of:			
Cotton and alfalfa	48,140	45,390	
No change in YIELD and PRICE of:			
Cotton and alfalfa	41,416	38,666	6,724
Cotton alone	44,278	41,528	3,862
Alfalfa alone	45,278	42,528	2,862
No change in PRICE of:			
Cotton and alfalfa	43,601	40,850	4,539
Cotton alone	45,993	43,243	2,147
Alfalfa alone	45,747	42,997	2,392
No change in YIELD of:			
Cotton and alfalfa	45,706	42,956	2,434
Cotton alone	46,272	43,521	1,868
Alfalfa alone	47,574	44,824	566

a/ Rounded.

Earnings on the 320-1 farm.--Total costs for the 320-1 farm, excluding interest on the land investment, declined $1,822 between 1953 and 1955.

TABLE 30

Gross Receipts, Costs, and Earnings by Crops and Total Farm, 320-acre Farms; 1955 and 1953

Item	Cotton lint	Cotton seed	Alfalfa	Field corn	Total farm
320-1 Farm: 1955					
	1	2	3	4	5
Acres	100		87	83	270
Yield	1.4 bales[a]	.595 tons[b]	6.25 tons	35 cwt.	
Production	140 bales	59.50 tons	543.75 tons	2,905 cwt.	
Price	$167.30/bale	$46.00/ton	$26.00/ton	$2.70/cwt.	
	$23,422.00	$2,737.00			
Gross receipts	$26,159.00		$14,137.50	$7,843.50	$48,140.00
Costs (less land)	18,414.87		9,972.46	8,881.16	37,268.49
Receipts minus costs	$ 7,744.13		$ 4,165.04	$-1,037.66	$10,871.51
Land interest ($400/acre c/ at 5%)	2,500.00		1,990.00	1,910.00	6,400.00
Net	$ 5,244.13		$ 2,175.04	$-2,947.66	$ 4,471.51
Add:					
Interest on fixed capital (incl. land)					8,313.98
Operator's labor d/					2,500.00
Net farm income					$15,285.49
Less:					
Operator's labor					2,500.00
Return to capital and management					$12,785.49
Rate earned on investment					7.70%

Item	Cotton lint	Cotton seed	Alfalfa	Barley	Total farm
320-2 Farm: 1955					
	1	2	3	4	5
Acres	100		87	103	290
Yield	1.4 bales[a]	.595 tons[b]	6.25 tons	23 cwt.	
Production	140 bales	59.50 tons	543.75 tons	2,369 cwt.	
Price	$167.30/bale	$46.00/ton	$26.00/ton	$2.15/cwt.	
	$23,422.00	$2,737.00			
Gross receipts	$26,159.00		$14,137.50	$5,093.35	$45,389.85
Costs (less land)	19,277.27		10,234.66	4,900.47	34,412.40
Receipts minus costs	$ 6,881.73		$ 3,902.84	$ 192.88	$10,977.45
Land interest ($400/acre c/ at 5%)	2,300.00		1,890.00	2,210.00	6,400.00
Net	$ 4,581.73		$ 2,012.84	$-2,017.12	$ 4,577.45
Add:					
Interest on fixed capital (incl. land)					8,313.98
Operator's labor d/					2,245.94
Net farm income					$15,137.37
Less:					
Operator's labor					2,500.00
Return to capital and management					$12,637.37
Rate earned on investment					7.62%

(Continued on next page.)

Table 30 Continued.

320-1 and 320-2 Farms: 1953

Item	Cotton		Alfalfa	Milo	Total farm
	lint	seed			
	1	2	3	4	5
Acres	183		87	10	280
Yield	1.3 bales a/	.553 tons b/	6.0 tons	24 cwt.	
Production	237.9 bales	101.1 tons	522 tons	240 cwt.	
Price	$148.99/bale	$53.00/ton	$21.60/ton	$2.75/cwt.	
	$35,444.72	$5,358.30			
Gross receipts	$40,803.02		$11,275.20	$ 660.00	$52,738.22
Costs (less land)	28,605.93		9,798.85	684.81	39,089.59
Receipts minus costs	$12,197.09		$ 1,476.35	$ -24.81	$13,648.63
Land interest ($400/acre c/ at 5%)	4,060.00		1,940.00	400.00	6,400.00
Net	$ 8,137.09		$ - 463.65	$-424.81	$ 7,248.63
Add:					
Interest on fixed capital (incl. land)					8,309.58
Operator's labor d/					2,500.00
Net farm income					$18,058.21
Less:					
Operator's labor					2,500.00
Return to capital and management					$15,558.21
Rate earned on investment					9.38%

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a/ 500 lb. bales (lint: 478 lbs.; bagging and ties: 22 lbs.).

b/ 850 lbs. or 0.425 tons of seed per bale of lint.

c/ Bare land was valued at an arbitrary figure of $400 per acre. This value was estimated from available rental and assessment values and is the figure used for Grades I and II based on all farm models. We found it impossible to obtain a realistic current market value of land on the Eastside since property does not change hands frequently enough to suggest an average sale value. We do not present the $400 estimate as a precise market value. Readers should not interpret it as such.

d/ Includes total operator's labor used in producing crops and in establishing 1/4 of total alfalfa acreage.

Since total gross receipts decreased by $4,598 over the same period, receipts-minus-costs were $2,777 less in 1955 than they were in 1953. The following is a summary of per acre costs and returns for each crop grown on the 320-1 organization:

320-1 Farm						
	Cotton		Alfalfa		Milo	Corn
Per acre	1953	1955	1953	1955	1953	1955
	1	2	3	4	5	6
	dollars					
Gross receipts	222.97	261.59	129.60	162.50	66.00	94.50
Variable expenses a/	110.34	124.39	60.31	61.40	43.28	76.41
Balance	112.63	137.20	69.29	101.10	22.72	18.09
Fixed costs	45.98	59.76	52.32	53.22	25.20	30.59
Balance	66.65	77.44	16.97	47.88	-2.48	-12.50

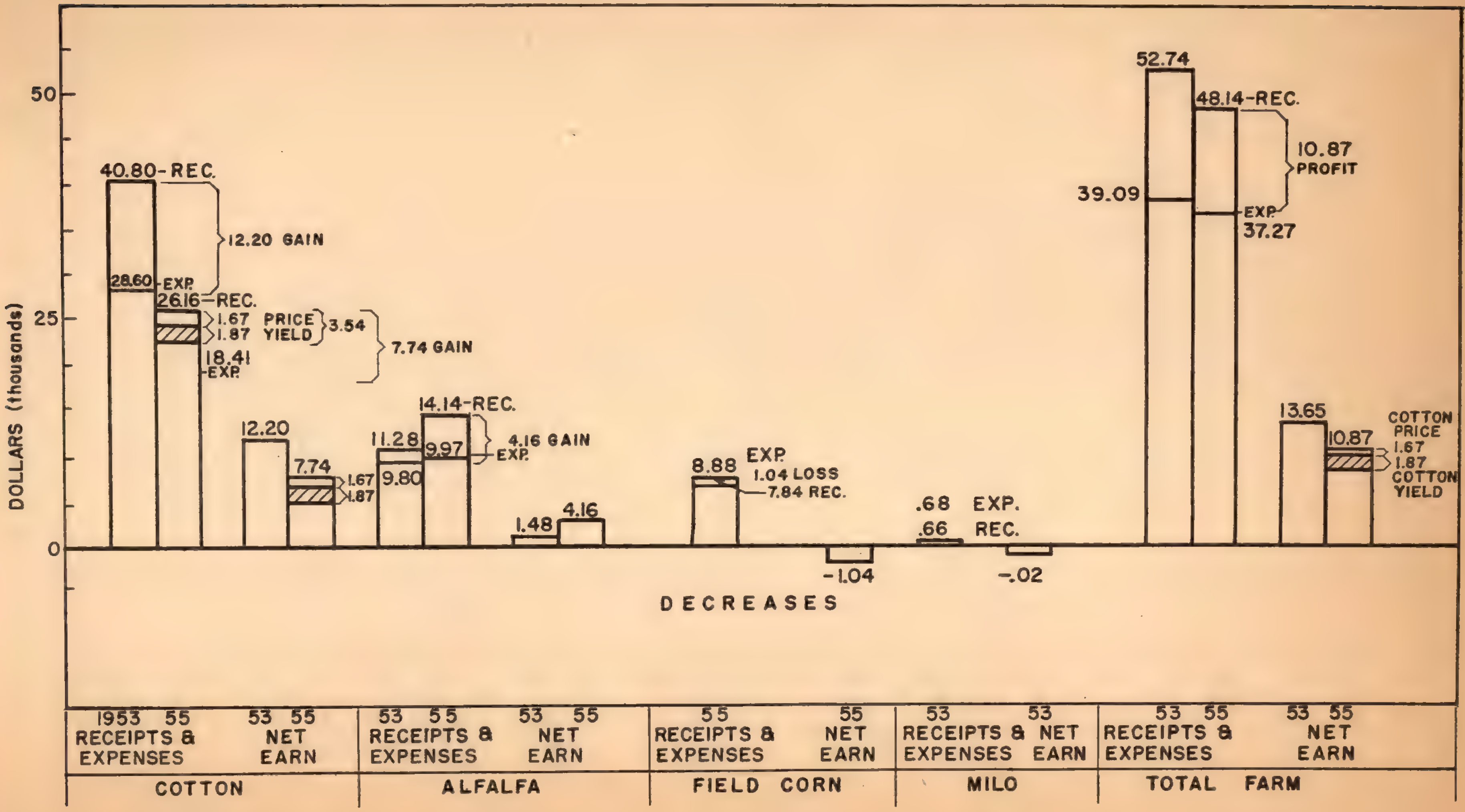
a/ Total variable expenses, excluding allocated variable expenses for the farm's pickup truck with accompanying labor, Social Security, and interest charges, are as follows:

Crop	1953	1955
Cotton	$104.40	$116.91
Alfalfa	54.22	54.42
Milo	40.15	--
Corn	--	72.50

A drop in net returns to cotton plus unfavorable results from corn explains the 1955 decline in total farm net for the 320-1 farm; alfalfa gained in net returns. Milo and corn gross receipts covered variable expenses, but not all fixed costs.

Net farm income for the 320-1 farm was $18,058 in 1953 and $15,285 in 1955 (Figure 7). This operation fully used the operator's labor in both years; we, therefore, readded its important cost, $2,500, in determining net farm income. We then deducted this amount to obtain the return to capital and management. This is a bookkeeping step which assumes that the operator could not have earned higher wages for his labor off the farm. The imputed cost of the operator's labor, thus, is the same as his return from the farm. The total interest on fixed capital increased in 1955 due to additional farm equipment purchases.

Figure 7. Changes in Gross Receipts, Expenses, and Net Returns on 320-1 acre Farm in San Joaquin Valley, Eastside, 1953-1955 (in thousands dollars)



The 320-acre farm earned less profit in 1955 than in 1953. Cotton yield and price gains were insufficient to offset acreage cuts on this farm. Alfalfa profits gained while corn showed losses.

Source: Calculated from survey data.

The rates earned on investment for the 320-1 farm were 9.4 percent in 1953, and 7.7 percent in 1955.

Earnings on the 320-2 farm.--Total costs for the 320-2 farm, omitting land interest, declined $4,678 between 1953 and 1955, while total gross receipts decreased by $7,348 over the same period. Receipts-minus-costs, consequently, were $2,672 lower in 1955 than they were in 1953. The following text table of *per acre* costs and returns illustrates these changes on a crop basis for the 320-2 organization:

	320-2 Farm					
	Cotton		Alfalfa		Milo	Barley
Per acre	1953	1955	1953	1955	1953	1955
	1	2	3	4	5	6
	dollars					
Gross receipts	222.97	261.59	129.60	162.50	66.00	49.45
Variable expenses a/	110.34	127.40	60.31	62.44	43.28	29.73
Balance	112.63	134.19	69.29	100.06	22.72	19.72
Fixed costs	45.98	65.37	52.32	55.19	25.20	17.85
Balance	66.65	68.82	16.97	44.87	-2.48	1.87

a/ Total variable expenses, excluding the allocated variable expenses for the farm's pickup truck with accompanying labor, Social Security, and interest charges, per acre variable costs are as follows:

Crop	1953	1955
Cotton	$104.40	$120.29
Alfalfa	54.22	55.61
Milo	40.15	--
Barley	--	26.01

Costs and returns in 1953 were the same as for the 320-1 farm. Cotton net returns on the 320-2 farm for 1955 dropped to slightly more than one-half their 1953 level. Gains in alfalfa partly offset the decline in cotton earnings, but could not compensate for the fact that barley performed worse than milo. The result was that total farm net returns over costs, including interest on land investment, fell from $7,249 in 1953 to $4,577 in 1955.

Net farm income on the 320-2 farm amounted to $18,058 in 1953 and $15,137 in 1955. This model utilized operator's labor fully in 1953, but driving time

declined to 2,246 hours after the 1955 adjustments. This decrease in operator's labor reflects the difference in labor inputs between barley and pre-allotment crops.

Receipts-minus-costs were higher in 1955 on the 320-2 than on the 320-1 farm, in spite of lower gross receipts on the 320-2 unit. Due to the difference in labor utilization on the two farms in 1955, however, net farm income on the 320-2 was $148 lower than for the 320-1 farm. The return to capital and management is also lower on the 320-2 farm. The operator of the 320-2 unit, thus, might have earned $254 more off the farm than he received for his actual labor on the farm in 1955.

The rate earned on investment was the same for both 320-acre farms in 1953 and differed by an unimportant percentage in 1955. If no price changes had occurred between these years, the rate earned on investment in 1955 would have been 4.9 percent on both farms.

SUMMARY AND CONCLUSIONS

Soil, climatic, and biological factors in the San Joaquin Valley Eastside favor a wide variety of crops, providing irrigation water is available at reasonable cost. The competition among crops for water, together with water costs, limit producing high-water-use crops and total crop production.

Short-run adjustments to cotton allotments, rather than complete farm reorganization, were typical on the 80- to 320-acre family farms in 1954 and 1955. Farmers held back from lines of production requiring additional investment and/or a waiting period before returns materialized. This was natural in view of general uncertainty regarding future production control policy and acre allotments. Operators, therefore, planted most of their diverted acres to annual summer crops. These crops had been of minor importance in pre-allotment cropping plans. Moreover, more land remained in fallow after allotments.

The four cotton farm models we developed for this study incorporate the typical land use adjustments that operators made. The 80- and 160-acre farms increased their alfalfa acreage and fallow land, and introduced corn in 1955. The 320-acre farms were producing cotton, alfalfa, and milo in 1953. Many of these operators seeded corn on their diverted cotton acres. Others produced barley. The 320-acre farms consequently include two organizations for 1955; both eliminated milo in this latter year.

Producers offset part of their cotton acreage reduction by increasing the yield on allotted acres. They did this largely by increasing fertilizer and water inputs. Furthermore, the less intensive use of part of the farm land gave producers the advantage of more favorable timing of seedbed preparation and cultivation, as well as better crop rotation. The cotton yield increases

in 1955 offset about 28 percent of the total physical acreage cut on the 80- and 160-acre model farms and 9 percent on the 320-acre farms.[1]

Typical cotton farms had the following per acre investments and fixed costs in 1953:

Farm	1953: Per acre	
	Average investments [a]	Total fixed costs
	1	2
	dollars	
80-acre	533	42
160-acre	513	34
320-acre	517	38

[a] Includes an estimated bare land value of $400 per acre.

Power and equipment items were nearly identical on the 80- and 160-acre farms. The investment and fixed costs of the 320-acre farms were higher than those of the 160-acre size, however, because these operators owned cotton and alfalfa harvesting equipment not found on the smaller farms.

The reduced cotton acreage caused lower annual use of most row-crop power and equipment items, but fixed costs did not decline with this lower use. Repair (variable) expenses tended to remain the same for the brief analysis period, even though equipment had less use. The result of these over-all tendencies was that costs per acre increased in 1955. The opposite change in per acre costs occurred for hay harvesting equipment on farms that increased alfalfa after cotton allotments. All farm models used more irrigation water in 1955, except the 320-acre farm growing barley. Additional irrigation on allotted cotton acres and higher water requirements for alternative crops caused this increase in water use.

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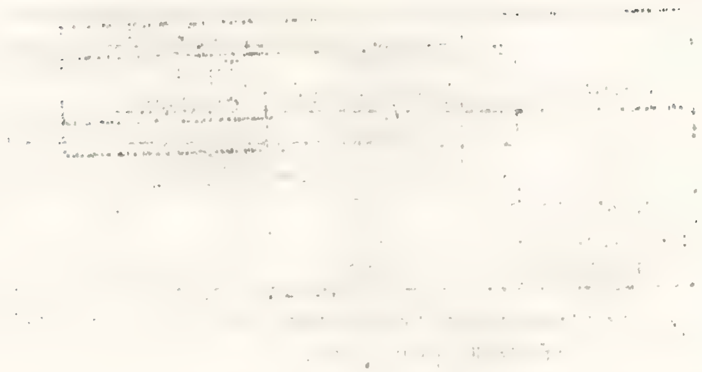
[1] Recent cotton yield estimates indicate that State yields for 1956 averaged 924 pounds per acre. The estimated 1957 yield, as of December 1, 1957, was 1,006 pounds per acre. (California Crop and Livestock Reporting Service.)

[illegible]



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The smaller-sized cotton farms contracted most of their cotton, corn, and alfalfa harvesting. This was not true for the 320-acre farms; the larger farm size made it economic for them to own harvesting equipment. The 320-acre farms were able to pick cotton at a lower cost per bale in 1953 with the owned harvester than the contract cost to the 80- and 160-acre farms. The reduced cotton acreage in 1955, however, raised picking cost per bale for the 320- above that of the 160-acre farm. The 1955 picking costs on the 80-acre farm were the highest even after allotments. The 160-acre farm, because of its size, was able to contract machine picking, but relatively low cotton acreage on the 80-acre farm required the more expensive hand picking.

Total annual tractor and truck driving hours decreased between 1953 and 1955 on all farm models. We assumed that the operator can work a maximum of 2,500 labor hours annually. It follows, therefore, that the smaller-sized farms did not use operator labor fully in either 1953 or 1955. On the other hand, the 320-acre farms in 1953 required 2,962 hours of labor, or 462 hours in addition to maximum operator work. This means that the 320-acre farm required additional part-time labor or a year-round man. After the cut in cotton acres, required operator labor hours dropped to 2,521 on the farm producing corn (the 320-1 unit) and to 2,246 on the farm producing barley (the 320-2 unit).

Total per acre variable expenses for producing cotton increased in 1955 due to: (1) higher unit costs of power and equipment, (2) additional fertilizer and water input costs, and (3) higher harvesting and processing costs accompanying increased yields. This increase applied to all farm sizes. The prices paid by operators for materials, labor, and contract services did not change between 1953 and 1955; thus the increases reflected the increased inputs. There was a definite inverse relationship between farm size and the

amount of variable expense per acre; the highest level was on the 80-acre, and the lowest on the 320-acre farms.

Total farm costs declined on the smaller-sized farms in 1955 while total gross receipts increased. On the 320-acre farms total costs also declined but total gross receipts dropped even more.

Farm	Total gross receipts	Total farm costs
	1	2
	Percentage change, 1953-1955	
80-acre	up 8.0	down 6.6
160-acre	up 0.2	down 7.3
320-1-acre	down 8.7	down 4.7
320-2-acre	down 13.9	down 12.0

The 320-1 farm had higher costs and returns in 1955 than the 320-2 farm because corn requires more inputs than barley.

Three important factors helped to prevent a precipitous drop in total gross receipts on all farms: (1) Farmers succeeded in increasing cotton yields without comparable cost rises, (2) Prices for both cotton and alfalfa increased in 1955, cotton prices by $15.34 per bale, and alfalfa hay by $4.40 per ton, (3) The receipts from crops planted on diverted cotton acres more than covered the variable expenses incurred in their production (therefore, leaving some funds to apply against fixed costs) even though these alternatives were not as profitable as cotton.

Earnings actually increased after allotments on the 80- and 160-acre farms, but decreased on the 320-acre farms.

Farm	1953			1955		
	Net farm income a/	Profit b/	Rate earned c/	Net farm income a/	Profit b/	Rate earned c/
	1	2	3	4	5	6
	dollars		percent	dollars		percent
80-acre	276	-2,224	-5.2	2,109	-391	-0.9
160-acre	7,249	4,749	5.8	8,776	6,276	7.6
320-1-acre	18,058	15,558	9.4	15,285	12,785	7.7
320-2-acre	18,058	15,558	9.4	15,137	12,637	7.6

a/ Total gross receipts less all cash costs plus the noncash costs, depreciation. Net farm income is the return to the operator for his labor, management, and capital.

b/ Net farm income less an estimated value of the operator's labor (2,500 hours at $1.00 per hour). Profit is the return to the operator for his capital and management.

c/ Profit expressed as a percentage of total farm investment.

These earning measures indicate a definite size advantage. While profits on the 80- and 160-acre farms increased in 1955, the actual dollar amounts were low compared with the 320-acre farm, both before and after allotments. The latter's advantage would have been greater except that it had lower cotton yields than the other units.

Net cash income (total gross receipts less total cash expenses) is an important measure of earnings for all operators, particularly those with non-deferrable financial obligations. This amount is the one that indicates funds the operator has available to support his family and meet cash obligations such as principal and interest payments. The owner-operator or the tenant, as well as the farm owner, may have these latter obligations. Net cash income was as follows on Eastside farm models:

Farm	1953	1955
	1	2
	dollars	
80-acre	2,080	3,916
160-acre	9,915	11,447
320-1-acre	25,009	22,187
320-2-acre	25,009	22,048

Our analysis in this study points to the following conclusions regarding the impact of farm adjustments on the farm models studied, following cotton acreage allotments in 1954 and 1955:

(1) Our findings relate to the three farm sizes specified, the 80-, 160-, and 320-acre family-operated units. We developed these models so that they fairly reflect conditions and earnings for the similar-sized farms in the San Joaquin Valley Eastside during the study period. They do not represent an average of ALL farms.

(2) Cotton was the most profitable field crop with a reasonable breadth of market both before and after acreage allotments. Farmers not only failed to find a substitute that would approach its profit-earning capacity, but were unable for most of their diverted acres to find one that would "break even" by covering the sum of variable expenses and fixed costs.

(3) Few farmers attempted long-term adjustments involving major reorganization or heavy capital investments in the two seasons studied. On the contrary, most adjustments were short-term involving improved production technology on crops already grown or planting new crops on diverted cotton acres.

(4) Allotments, under the above conditions, worked a hardship on practically all growers for the reason that total farm fixed costs showed little or no declines, while gross receipts dropped sharply with the cotton cuts.

(5) The most effective farmer adjustment was to increase cotton yields--without comparable increases in variable expenses. Official data for the 1956 season indicate that farmers are continuing this adjustment. How much farther they can go profitably remains to be seen. Our study showed that in 1954 and 1955 the 320-acre farms were less successful in increasing yields than the other models.

(6) The smallest farm model had the highest cost per acre for cotton production, and the largest size the smallest cost, but costs for all three sizes rose from 1953 to 1955.

(7) Favorable price changes--rises--for cotton lint and alfalfa acted to offset much of the cotton acreage cuts. Farmers cannot count on this favorable price change consistently!

(8) Acreage reductions aggravated equipment efficiency problems where size is a factor; it increased the farm size on which a mechanical harvester can operate profitably.

(9) Our study does not reveal what are the BEST adjustments according to farm size. We are convinced that farmers will continue to seek profitable adjustments to acreage allotments and any other major problem-creating factor. We suspect that many of these adjustments will involve long-term changes in production organization and investments.

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Division of Agricultural Sciences
UNIVERSITY OF CALIFORNIA

FARM ADJUSTMENTS AND EARNINGS UNDER 1955 COTTON ACREAGE ALLOTMENTS

4. Central San Joaquin Valley Cotton Farms, 1953–1955

Douglas D. Caton
Trimble R. Hedges
W. Neill Schaller

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ACKNOWLEDGMENTS

This investigation of the impact of the cotton acreage allotment program on farm organizations, production, and earnings in the Central San Joaquin Valley resulted from a study by the Giannini Foundation of Agricultural Economics, California Agricultural Experiment Station, and the Farm Economics Research Division, Agricultural Research Service, United States Department of Agriculture.

J. Herbert Snyder and H. Russell Shaw, Assistant Professors of Agricultural Economics, Assistant Agricultural Economists in the Experiment Station, and on the Giannini Foundation, had major responsibility in collecting the field data. Charles A. Carpy, Assistant Specialist in the Experiment Station and on the Giannini Foundation, shared in the analysis.

John C. Crecink, Agricultural Economist, Warren R. Bailey, Assistant Head, Western Field Research Section, and M. L. Upchurch, Head, Western Field Research Section, all of the Farm Economics Research Division, participated in outlining and developing the project research plans.

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Finally the credit for the statistical and stenographic work goes to personnel in the Giannini Foundation.

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FARM ADJUSTMENTS AND EARNINGS UNDER 1955 COTTON ACREAGE ALLOTMENTS

4. Central San Joaquin Valley Cotton Farms, 1953-1955

HERE ARE THE HIGHLIGHTS OF THE FINDINGS:

COTTON IS PROFITABLE, though soils and climate are less favorable than farther south -
See pages 7-11

MORE FEED crops represented the major acreage adjustment -
See pages 23-27

FAMILY FARMS of 80-, 160-, and 320-acres represent the primary concern in this study -
See pages 22-23

SMALL FARMS were most numerous, but larger ones had bulk of the cropland and cotton acreage -
See pages 18-22

HIGHER YIELDS, from improved production technology, proved to be the most effective post-allotment adjustment -
See pages 28-29

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See pages 102-103

FARM ADJUSTMENTS AND EARNINGS UNDER 1955 COTTON ACREAGE ALLOTMENTS

4. Central San Joaquin Valley Cotton Farms, 1953-1955 [1]

Douglas D. Caton [2]
Trimble R. Hedges [3]
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ACREAGE ALLOTMENTS REQUIRE CHANGES IN FARM RESOURCE USE THAT MAY AFFECT EARNINGS

Cotton Acreage Allotments Removed Land From Cotton, and Left Farms With Adjustment Problems

The Secretary of Agriculture reintroduced cotton acreage allotments in 1954, and reduced them further in 1955. These actions required cotton producers to cut down cotton and find new crops. [4] The consequent adjustments

---

[1] This report is the fourth of a series based on detailed investigations of the changes in farm organization, production, and earnings under the cotton acreage allotments beginning in 1954. This research comes under California Agricultural Experiment Station Project Number 1641 and is partially supported under Line Project PE e3-5(w), Farm Economics Research Division, Western Field Research Section, U. S. Department of Agriculture. The order of listing for the authors does not imply seniority of authorship.

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[4] Cotton acreage allotments and marketing quotas originated with the Agricultural Adjustment Act of 1938 and are governed today by this statute, its amendments, and a body of related laws passed since 1938. When quotas are deemed necessary by the Secretary of Agriculture due to a surplus over needs, they must be approved by a vote of two-thirds of the nation's cotton producers. If the quota is not approved, the price support for the crop is reduced to about 50 percent of parity. See Commodity Stabilization Service, U. S. Department of Agriculture, Compilation of Statutes Relating to Soil Conservation, Marketing Quotas and Allotments, Crop Insurance, Sugar Payments and Quotas, Price Support, Commodity Credit Corporation, and Related Statutes--as of January 1, 1955, Agriculture Handbook No. 79, pp. 47-58.

have affected resource use and net income. We assume that the farmer's objective is to maximize his net farm income over time; therefore, two questions demand answers: (1) What has been the actual effect of reduced cotton acreage, and (2) What is the optimum adjustment that the farmer can make? This study will concentrate on the first question.

Allotments for upland cotton were in effect from 1938 to 1942, national allotments averaging slightly over 27 million acres per year. In 1950, acreage restrictions were again effective for one year, with a national allotment of 21 million acres. A cotton surplus in 1952 and 1953 brought production control back into effect. Farmers approved marketing quotas in December, 1953, and the Secretary of Agriculture established a national allotment of 21,379,000 acres for 1954. Acreage restrictions have been in effect continuously since 1954. The national allotment was 18,113,000 acres in 1955, 17,391,000 acres in 1956, and 17,585,463 acres in 1957. The United States total acreage reserve sign up amounted to 3,106,281 acres in the latter year, thus reducing the allowable total for harvest to 14,569,182 acres. 1/

Anything which has an effect on cotton acreage, yield, or price in California has a significant economic impact. Table 1 illustrates the economic importance of cotton in 1953 and indicates the change in this importance which accompanied acreage restrictions from 1954 through 1957.

We Undertook to Analyze How Cotton Acreage Allotments Affected Farm Resource Use and Earnings From 1953 to 1955

The objective of this study is to determine and to compare the net farm income on California cotton-producing farms under pre-allotment and post-allotment conditions. The relationships that we study are those associated with the physical and economic adjustments which farmers made.

1/ Commodity Stabilization Service, U. S. Department of Agriculture, Acreage Allotment and Marketing Quota Summary, September, 1955, and Agricultural Marketing Service, The Cotton Situation, June, 1957.

TABLE 1

California Cotton Acreage, Yields, Prices, and Total Value, 1953-1957

Cotton	Units	1953	1954	1955	1956	1957 a/
	1	2	3	4	5	6
Acres harvested	1,000 acres	1,340	883	745	749	716
Lint yield per acre	pounds	632	806	774	924	1,006
Total lint production	1,000 bales	1,768	1,487	1,205	1,446	1,500
Price per pound	dollars	.3117	.3332	.3308	.3265	.3620
Total lint value	1,000 dollars	275,488	247,677	199,322	236,027	271,556
Seed yield per acre	pounds	1,076	1,402	1,329	1,509	1,704
Total seed production	1,000 tons	721	619	495	565	610
Price per ton	dollars	53.10	59.20	46.10	62.10	52.70
Total seed value	1,000 dollars	38,287	36,645	22,820	35,086	32,147
Total value, lint and cotton seed	1,000 dollars	313,775	284,322	222,142	271,113	303,703
Total value, all crops from farm marketings	1,000 dollars	1,662,660	1,613,574	1,692,469	1,829,774	1,752,606
Value of cotton as percent of value of all crops	percent	18.9	17.6	13.1	14.8	17.3
Total value all commodities from farm marketings	1,000 dollars	2,633,910	2,518,384	2,640,728	2,819,695	2,774,194
Value of cotton as percent of value of all commodities	percent	11.9	11.3	8.4	9.6	10.9

a/ Preliminary for 1957.

Source: (1) Value, all crops; and Value, all commodities, Farm Income Situation Reports, U. S. Agricultural Marketing Service. (2) All other data, California Crop and Livestock Reporting Service.

Farmers, Farm Supply Agencies, and Official Sources Provided Facts

The San Joaquin Valley is the largest cotton-producing area in California. We limited the present study, however, to the "Central" subarea of the Valley which includes all of Madera County and that portion of Merced County lying east of the San Joaquin River. [1] A later report on the San Joaquin Valley Westside considers southwestern Merced County cotton farms along with others occurring to the south under "Westside" conditions. Cotton gin locations indicate fairly closely where cotton-producing portions of Central subarea are located, and where cotton farms tend to concentrate (Figure 1).

The examination of actual adjustments on farm "models" constitutes the major part of this study. We developed four farm model organizations or "typical" cotton-producing units to facilitate the analyzing of allotment effects and adjustments. These are as follows:

Number of models	Type of organization	Acres
1	Cotton-alfalfa	80
2	Cotton-alfalfa	160
1	Cotton-alfalfa	320

Our first step in defining the typical farm organizations for study was to determine land and water resource characteristics and climatic conditions in

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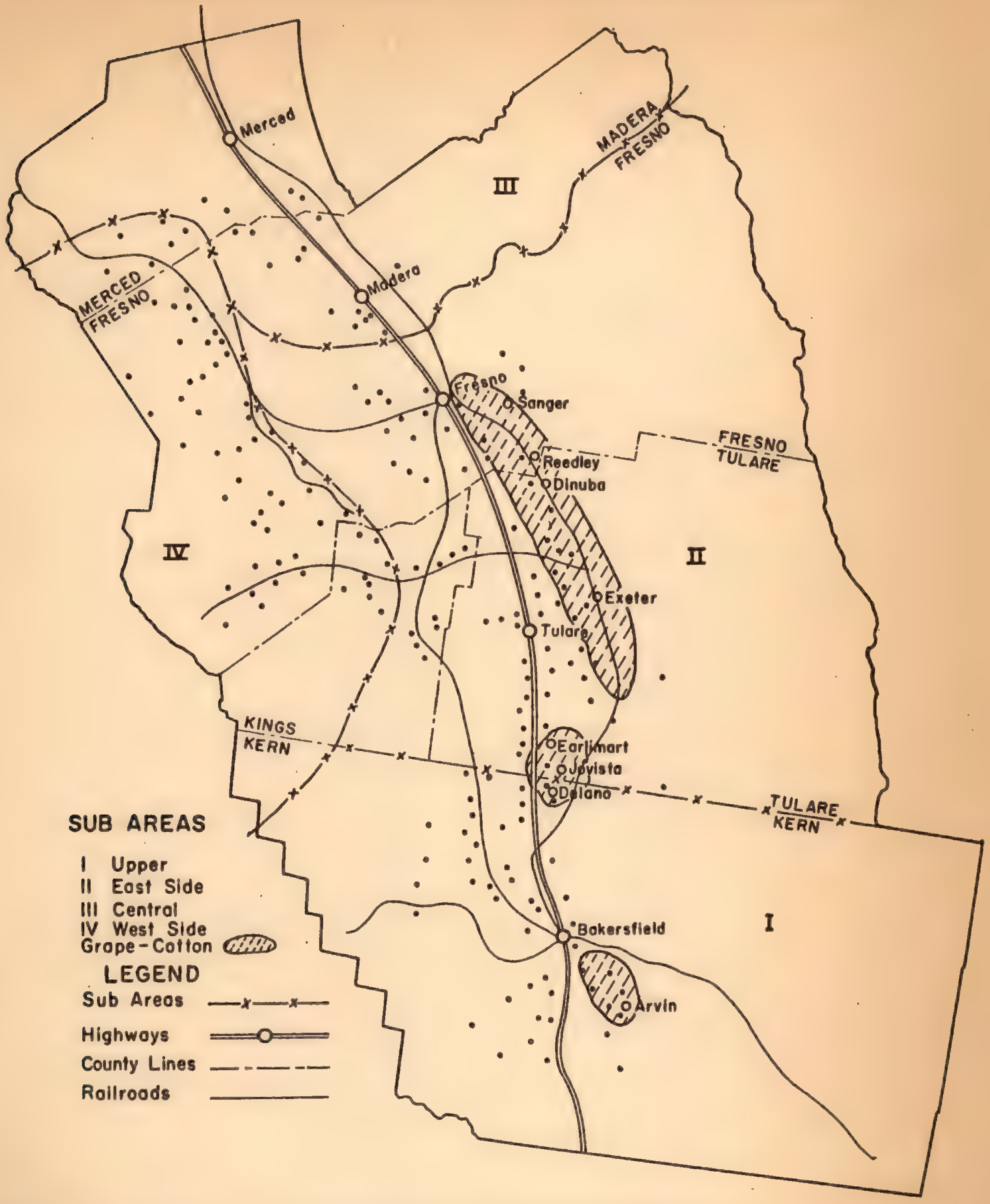
[1] Studies of allotment effects on the Upper and Eastside San Joaquin Valley, previously released, are a part of this project. See Hedges, Trimble R., Farm Adjustments and Earnings under 1955 Cotton Acreage Allotments. 1. Upper San Joaquin Valley Cotton Farms, 1953-55, Calif. Agr. Exp. Sta., Giannini Foundation of Agricultural Economics, Mimeo. Report No. 191, December, 1956.

Also see Athanassatos, D. C. and Trimble R. Hedges, Farm Adjustments and Earnings under 1955 Cotton Acreage Allotments. 2. Small Grape-Cotton Farms on the San Joaquin Valley Eastside, 1953-1955, Calif. Agr. Exp. Sta., Giannini Foundation of Agricultural Economics, Mimeo. Report No. 194, May, 1957; and Caton, Douglas D., Trimble R. Hedges, and W. Neill Schaller, Farm Adjustments and Earnings Under 1955 Cotton Acreage Allotments. 3. San Joaquin Valley Eastside Cotton Farms, 1953-1955, Calif. Agr. Exp. Sta., Giannini Foundation of Agricultural Economics, Mimeo. Report No. 202, February. 1958.

Figure 1. Cotton Gins in the San Joaquin Valley by Subareas



Source: Cotton Gins, Courtesy Southern Pacific Railway Co.

the subarea . We used U. S. Department of Agriculture soil survey reports, and data from the Bureau of Reclamation to establish soil and water resources available, while U. S. Weather Bureau records and reports provided information on climate. Sample data on farm size, relative numbers, total crop acres, and cotton acreage per farm from 1953 through 1955 provided the bases for farm model sizes and cropping plans. These data came from the California Agricultural Stabilization and Conservation Committee records and from farmer questionnaires. Questionnaire replies contributed information on the acreages of crops, other than cotton, produced in 1953 and 1954, and on cotton fertilization practices. Farmer interviews also provided organization, practice, yield, and management data. Price and cost data came from many sources; farmers, farm service agencies, and official reporting services.

After deciding organization characteristics for each farm model, we prepared calendars of operations for all crops involved. These reflect the production practices of the farmers interviewed in the subarea, and supplementary information from other sources. Next we used budget analysis to determine the net economic effect of cotton allotments. We compared organization and net farm income for each model in 1953 and 1955. The budget analysis required the following steps to determine net farm income; (1) prepare input tables, using the data in the calendars of operations, (2) calculate fixed and variable costs for these inputs, (3) determine gross receipts, using appropriate yields and prices, (4) calculate the differences between gross receipts and costs, and (5) summarize in profit and loss statements.

SOIL AND CLIMATE LIMIT COTTON IN CENTRAL SUBAREA

Soils Range From High-Yielding Alluvium to Upland Unsuited for Cotton

Soil survey reports for Madera County and Eastern Merced County provided detailed information on Central San Joaquin Valley subarea soils. [1] The latter of these reports omits the portion of Merced County lying west of the San Joaquin River, but this presents no problem in the present analysis; we consider this area in a forthcoming report on the San Joaquin Valley Westside.

The physiographic subdivisions in eastern Merced County indicate, over-all, the soil resource situation in Central subarea. Soil scientists identified the subdivisions as follows: recent alluvial fan and flood plain soils, young alluvial soils, basin soils, low terrace soils, high terrace soils, and upland soils. Most of the cotton grown in both counties occurs on the first two alluvial soil classifications. Soils of such origin represent one-third of Merced County, with basin soils another fifth, and terrace and upland soils the remainder. Some growers do produce cotton economically on certain of the basin soils, if these latter are not too heavy in texture and contain only slight alkali.

The best cotton lands in both counties are the lighter-textured sandy loams and loams ranging from grade 1 to grade 3 under the Storie Index System. [2] These occur, naturally, on the recent and young alluvium. The basin soils that produce cotton usually classify as grade 3 or 4 according to the Storie index.

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[1] Weir, Walter W., Soils of Madera County California. Calif. Agr. Exp. Sta., University of California Soil Survey No. 12, January, 1956; and Arkley, Rodney J., Soils of Eastern Merced County California. Calif. Agr. Exp. Sta., University of California Soil Survey No. 11, November, 1954.

[2] Storie, R. Earl, An Index for Rating the Agricultural Value of Soils. Calif. Agr. Exp. Sta., University of California Bulletin No. 556, September, 1933 and June, 1937.

Some of the more important cotton-producing soil series in the two Central subarea counties are as follows:

	Madera County	Merced County
Grades 1 and 2	Hanford, Grangeville, Pachappa and Ripperdan	Hanford, Honcut, Pachappa and Wyman
Grade 3	Grangeville and Delhi	Burchell, Pachappa, Temple and Wyman

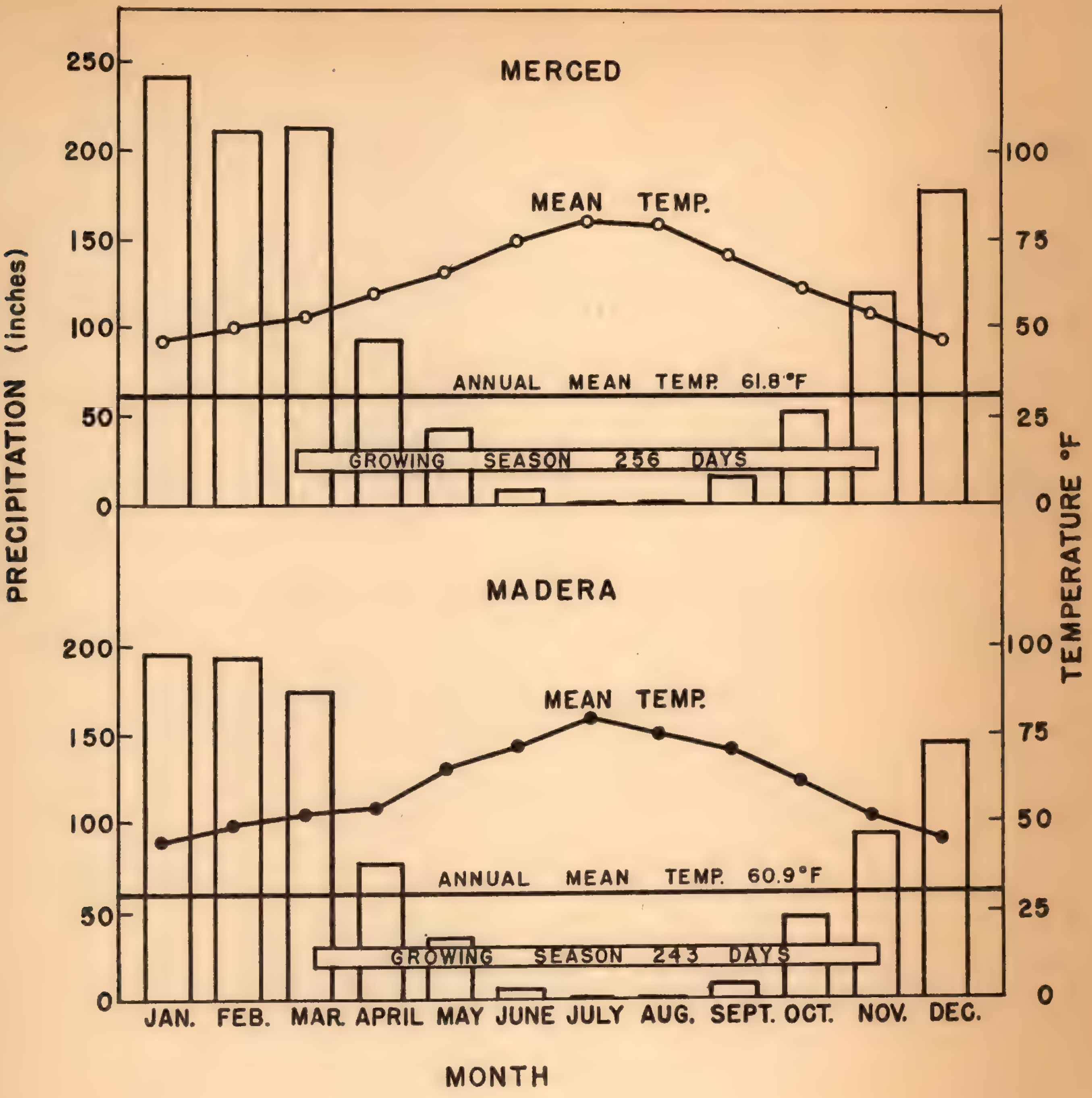
Central subarea cotton producers have demonstrated in recent seasons that grades 1 and 2 soils under proper management are capable of producing 2 or more bales of cotton to the acre under favorable weather conditions. (A bale of lint cotton contains 478 pounds of cotton lint and weighs 500 pounds gross, including bagging ties.) Such yields were relatively rare at the time we interviewed farmers in 1955, but occur more frequently since that time as yields increase in this and other portions of California.

The Central subarea does not have as much grade 1, 2, and 3 land for producing cotton as either of the other two subareas to the south, San Joaquin Valley Eastside and Upper San Joaquin Valley. This is partially because the total geographic area is less, but also reflects a smaller percentage of the total soil resources in these more productive soils. Central, therefore, ranks lower than these other subareas in both cotton yields and total production. Climate, as well as less favorable soils resources, is a factor in explaining Central's ranking in both yields per acre and total production. We consider climatic characteristics in the following section.

Central is California's Farthest North Subarea With Climate Favorable to Cotton

The mean annual precipitation at Madera is about 10 inches, occurs mostly between October and April (Figure 2). Rainfall along the San Joaquin River in Madera County averages about 8 inches per year, and increases gradually with elevation.

Figure 2. Precipitation, Temperatures, and Growing Seasons; Merced and Madera[1]



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[1] Sources: Climatological Data, U.S. Weather Bureau; Period averages: Precipitation; Merced 85, Madera 57 years; Temperatures — Merced 83 Madera 57 years.

The mean annual temperatures in the Central subarea favor producing long-season crops, but are less favorable for cotton than those farther south in the San Joaquin Valley. Thus, the mean July temperatures, 78.9° F. at Madera, and 79.1° F. at Merced, are lower than at Fresno (81.3° F.). Midday summer temperatures usually range from 90° to 100° F. The historical maximum and minimum temperatures recorded at Madera are 115° F. and 10° F., respectively. Winters usually are relatively mild. The frost-free period extends from mid-March to late November, a period of about 245 days, again a distinctly shorter period than at Fresno and more southerly points in the San Joaquin Valley (Fresno has 295 frost-free days) (Table 2).

Due to limited rainfall and its seasonal distributions, farmers must irrigate summer crops to obtain economic yields. The amount of water pumped has tended to exceed the rate of recharge of groundwater, due to growth in both agricultural and urban use. Thus, the water table in the Madera Irrigation District dropped 22 feet between 1922 and 1946.[1] People in the Central subarea have improved their situation by purchasing supplemental surface water from the Central Valley Project and diverting other natural waters. Thus, they are supplementing well water, but they still have not eliminated their water availability problems. Furthermore, water costs have increased, as might be expected with a falling water table. Madera County producers obtain water from the Fresno River and from the Madera Canal which latter facility delivers San Joaquin River water from its Millerton Lake storage. Merced County producers divert water from the Merced River.

Farmers irrigate summer crops during the entire growing season, but apply about one-fourth of the total irrigation water during July. Many growers

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[1] U. S. Department of Interior, Bureau of Reclamation: Factual Report, Madera Irrigation District, Central Valley Project, California. March, 1950.

TABLE 2

Climatic Summary: Madera and Merced, California

Climatic measure	Madera	Merced
	1	2
Temperature (40-year record)		
January average	44.3° F	45.1° F
July average	78.9° F	79.1° F
Maximum recorded	115.0° F	116.0° F
Minimum recorded	10.0° F	16.0° F
Growing season (36-year record)		
Average date of last killing frost	Nov. 17	Nov. 20
Average date of first killing frost	Mar. 19	Mar. 9
Average length of growing season	243 days	256 days
Precipitation (40-year record)		
Mean annual	9.81 in.	11.81 in.

Source: U. S. Department of Agriculture, Yearbook of Agriculture, Climate and Man, 1941.

also irrigate during the winter and other off-seasons, in order to store water in the soil for later crop use.

Controls for Insects, Diseases, and Weeds Increase Production Costs

Crop pests, particularly insects, diseases, and weeds, present serious problems to cotton growers in the Central subarea, as in other parts of the California cotton-growing region. In the absence of control, growers find their yields reduced, quality impaired, or experience both difficulties. The consequences, of course, are lowered receipts and profits. Growers know this, and, therefore, undertake control programs, involving important outlays for materials, equipment, and services that serve to eliminate or minimize pest damage. These controls inevitably increase production costs, and may become prohibitive in certain instances involving particular crops or pests. Such new developments as the upsurge of the spotted alfalfa aphid as a serious threat to production and profits from alfalfa hay, illustrate the continuing importance of pests to farmers.

Some of the more important of the many insects that harm cotton include cotton aphids, lygus bugs, Atlantic and other mites, and bollworms (corn earworm). Control measures include primarily dusts and sprays, applied by ground or air equipment. Rootknot nematode also may give serious trouble. Growers combat them by rotation, summer fallow, or soil fumigation. Verticillium wilt is one of several diseases that may lower cotton yields significantly. The most effective control is to use resistant seed.

Weeds are most serious in the localities using surface irrigation water delivered through open ditches. They may interfere with yields, seriously lower quality and selling prices, as does grass in cotton, or merely compete with the crops for the limited irrigation water. The cost for controlling weeds includes most of those involved in cultivating, hoeing, and even the operation commonly called thinning cotton. Growers could spare the expense for

the latter if the sole problem were to thin the cotton plants; the real justification for it is to kill competing weeds. Thus, weeds alone account for a large share of cotton production costs incurred after the plant emerges from the ground.

Economic Factors Exert Important Influences on Production Adjustments

Farmers confronted with cotton acreage allotments in 1954, could limit their corrective action to short-run adjustments, make long-run shifts in farm organization and resource use, or combine both lines of action. Various elements of the situation, such as uncertainty regarding future control policies, limited capital availability, tenure status, and level of technical knowledge tended strongly to favor short-run adjustments. These latter include changes in (1) acres in specific crops (a reduction required for cotton by the allotments), (2) kinds and quantities of variable inputs, such as fertilizer and irrigation water, (3) rates of using services from presently-owned capital goods such as tractors, harvesting machines, and land itself, and (4) shifts in the form, time, place, or outlet for selling specific products.

Most farmers chose to make short-run adjustments in 1954; they held back from the longer run shifts involving changes in machinery, livestock, or other capital goods, and thus in the quantity of services from such relatively fixed factors. A long-term adjustment, such as adding an orchard crop, a livestock enterprise, or some new line of production requiring added machinery or equipment, almost always requires substantial added investments. These new funds often mean borrowing, with accompanying problems in debt management and repayment.

The specific short-run adjustments that Central subarea cotton growers used in 1954 include the following courses of action: (1) removing from cotton the number of acres required by allotments, (2) allocating this diverted land

to other crops or uses, (3) changing the technology and inputs for growing cotton (and sometimes other crops) to increase yields economically, (4) changing the rate of using land for cotton, and (5) changing the disposal methods for crops other than cotton. In addition, by 1955 a tendency developed toward adding to these short-run adjustments an important long-run change--leveling and other permanent soil improvements.

Few crops that are possible alternatives to cotton for any sizeable number of growers can compete successfully with that crop in earnings. Farmers in the Central subarea are well aware of this fact, as is indicated by their rapid increase in cotton production prior to the 1954 allotments. It is not surprising, therefore, that they gave high priority among post-allotment adjustments to cotton yield-stimulating measures. Typically, they found their most effective short-run adjustment was to push cotton production per acre to the maximum profit point on their allotted acres. Thus, they planted their best-adapted soils to this most profitable crop, increased inputs of fertilizer, irrigation water, and other services, and tried in every way possible to adjust their operation timing to get the maximum profits from cotton.

Farmers made little change from 1953 in the crops they selected to use diverted acres in 1954 and 1955, for reasons suggested above. For the most part, they expanded the acreage of alfalfa hay, barley, grain sorghum, and field corn. The relative emphasis that an individual cotton grower placed on these various crops, as well as a limited number of others, depended upon his particular resource situation, physical and economic relationships among these crops, and his own estimate of future developments in prices and costs. Most growers could more readily expand acres for a crop already included in their cropping system than bring in a new enterprise; they were both acquainted with, and tooled up for, the crops presently grown.

Farmers always face considerable price uncertainty. Both price and cost uncertainties increase as the planning period interval extends into the future. Long-term adjustments, however, may reward the farmer with profits higher than those from short-term adjustments. Land improvement and changes in power and equipment, for example, widen the range of alternative enterprises available to the producer.

Human and Institutional Factors Affect Farmer Decisions

A farmer rarely has equal skill and personal preference for all possible alternative enterprises. While one adjustment plan may offer optimum net income, a farmer may choose one that is less profitable but more in keeping with his skill and knowledge, individual preferences, or other personal factors.

A cotton producer's tenure arrangement is another factor which may affect his choices and decisions. Tenants control only operating and other movable equipment--chattels. They, therefore, must obtain the landlord's agreement on reorganization decisions involving real estate. If the lease period is short, the operator will strive for maximum short-term gains; he will resist adjustments that offer smaller immediate returns, even though they may appear more rewarding over a longer period. The farmer's expectations regarding future cotton acreage restrictions and price supports are important in his present decisions. If cotton is the most profitable crop, the producer may be reluctant to reorganize his production program and make heavy financial commitments. He may believe the possibility that cotton acreage restrictions will be relaxed justifies delaying major long-term adjustments. Price support and productions control policies for substitute crops, or anticipated changes in them, also may exert heavy influence on grower adjustment decisions. Producers in Central subarea have had only a limited opportunity to use diverted acres for producing sugar beets, for example, due to restrictions on

this alternative crop. Likewise, lack of available market outlets may effectively eliminate certain crops from using diverted cotton acres. Thus, vegetable and other specialty crops often depend on contracts, or other special arrangements for profitable sale. The Soil Bank, under its Acreage Reserve and Conservation Reserve programs, respectively, offers farmers the opportunity to withdraw acres from both crops with allotments, such as cotton, and other cultivated crops to the extent of the Soil Bank base, which includes generally all the land the farmer uses for cultivated crops or for tame hay. Depending upon the farmer's own situation, and the specific regulations and payments at a particular time, a grower may find one or both of these programs attractive.

Cotton acreage allotment programs in 1954 and 1955, were quite effective in attaining their intended objectives; they took large amounts of land out of cotton. They, therefore, required most individual growers to cut plantings. These cotton acreage reductions presented serious problems to all cotton farmers with more than a few acres. This would be true if several other alternative uses, equally as profitable as cotton, were available for diverted acres. This is because most growers would have to change farm organization and practices. The accompanying difficulties were aggravated for the cotton growers in 1954 and 1955, however, because most were not successful in their search for uses equally as remunerative as cotton on the diverted acres. They, therefore, experienced drops in earnings, as well as problems in shifting the use of diverted acres.

We begin with land use changes. Answers to the following questions will serve effectively to indicate the impact of cotton acreage allotments on farm cropland organization. "What are the sizes of farming units, and what are their relative numbers?" "How is the total farm divided among these various farm sizes and farm operators?" "How did farm operators use their cropland prior to allotments?" "How did they change this cropping pattern after allotments?"

We were able to obtain a great deal of information on land use adjustments under the allotments; we have summarized and classified it to determine the major impacts on cotton, other crops, and fallow land. Other forces were operating at the same time as the allotments, and some of the changes that our analysis reveals undoubtedly relate to these other factors. We did not attempt, however, to measure precisely the part of each change due to each factor. The available information points clearly to the conclusion that cotton acreage allotments were the major force governing changes that farmers made in their land use and crop acreages from 1953 to 1955. We, therefore, centered our attention on this program as the main problem.

FARMS OF ALL SIZES RECEIVED ALLOTMENTS: ALL BUT SMALLEST REQUIRED COTTON ACREAGE CUTS

Small Units Showed Greatest Numbers; Large Ones had Most Cropland and Cotton

The preceding sections have served to define the major resource conditions and other forces affecting farmers at the time cotton acreage allotments came into effect in 1954. Our task is to determine how these allotments and accompanying adjustments affected individual farm organizations and operations. But farmers in the Central subarea operate farms varying widely in size, cropping systems and other characteristics. It is essential, therefore, to select a limited number of the more typical and more frequently occurring farm organizations for analysis. We used two land-use characteristics as our primary guides for this purpose, the number of total acres in the farm, and how the growers allocated this land among the several crops and other uses. Once we decided the important features of the farm models for analysis, we could develop budgets to test and measure the impacts of acreage allotments, other adjustments, and such accompanying changes as those in prices and costs.

Our first step in developing analysis models was to collect and summarize detailed information indicating the important characteristics of Central cotton farms before, and immediately following, allotments. Data for this purpose came from three sources: (1) a complete listing of cropland, both pre- and post-allotment cotton acres on county Agricultural Stabilization and Conservation Committee records, (2) questionnaire returns on crops other than cotton by 30 percent of the 1954 cotton allotment holders, and (3) interview records obtained from a sample of growers in three size groups. We used the information from the county records and questionnaire returns to obtain our interviewee sample.

The county Agricultural Stabilization and Conservation Committees allotted cotton acres to 1,711 growers in Central subarea for the 1954 season. This total

includes those in the portion of Merced County lying west of the San Joaquin River, as is true of all the following data referring to summaries for the Central subarea as a whole. Farm numbers varied inversely with size: 1-60 acre units included 801 allotments; 61-420 acre farms 734 allotments; 421-1,100 acre operations 124 allotments; and larger allotment holders 52. This means that almost half the allotments in 1954 went to units of 60 acres or less, while those over 420 acres received 10 percent of the total allotments. The remainder (43 percent) went to operations in the 61-420 acre range, or to operators on farms of approximately 80, 160, or 320 acres (Table 3).

Cotton acre distribution before allotments agreed, in general, with that for cropland, but the two smaller sized operations had a larger percentage of cotton than of cropland (9 versus 7 percent, and 40 versus 32 percent). A smaller percentage of cotton than of cropland for the 1,100 acre and larger operator made this possible (27 versus 38 percent). Cropland and cotton acre distributions were roughly inverse to allotment holders, as is evident in the following text table showing percentages by farm size for all times.

	Allotments	Cropland	Cotton
	-- (percentages) --		
1 - 60	47	7	9
61 - 420	43	32	40
421 - 1,100	7	23	24
1,101 and over	3	38	27
Totals	100	100	100

The cotton allotment program had the dual effect, between 1953 and 1955, of reducing total cotton acres in Central subarea 62,000 acres (45 percent), and shifting the percentage slightly in favor of the 60 acre or smaller units and away from the 80 to 320 acre operations. All groups received cuts in allowable cotton acreage, but allotment holders on the smaller units had a smaller percentage reduction.

TABLE 3

Farm Size, Average Cotton Acres, and Acres Diverted, 1954 and 1955: Central San Joaquin Valley

Cropland class intervals	Number of farms	Cropland		Average cotton acres				Diverted acres	
		average per farm	total	3-year average 1951-1953	1953	final allotment 1954	acres planted 1955 a/	3-year average to 1954	3-year average to 1955
	1	2	3	4	5	6	7	8	9
		acres							
1 - 20	310	14.2	4,392	7.9	11.5	9.8	7.6	1.95	- .34
21 - 60	491	39.4	19,359	20.6	26.2	15.9	12.2	- 4.75	- 8.45
61 - 100	271	78.4	21,241	40.6	46.0	27.9	21.4	- 12.70	- 19.20
101 - 220	307	150.0	46,064	69.5	76.5	48.6	37.3	- 20.90	- 32.22
221 - 420	156	295.6	46,113	141.2	140.3	94.8	72.7	- 46.42	- 68.48
421 - 660	75	523.8	39,284	226.7	222.7	157.8	121.1	- 68.87	-105.60
661 - 1,100	49	886.4	43,434	330.0	322.2	233.9	179.4	- 96.08	-150.51
1,101 + above	52	2,570.2	133,652	706.6	691.3	498.5	382.4	-208.10	-324.12
Total	1,711	206.6	353,539	80.0	90.8	56.9	43.7	- 23.10	- 36.34

a/ Estimated.

Source: California Agricultural Stabilization and Conservation Committee.

One comparison that reveals clearly how seriously the allotment program affected cotton acreages according to farm size, is the percentages that cotton allotments represent of three-year, 1951-1953 cotton acreages. The over-all percentage for all farms combined is 55 in 1955, or the difference between 100 percent and the previously-mentioned 45 percent cut (Table 4). The range for individual farm sizes is from 96 percent for the smallest allotment holder to 54 percent for the largest.

TABLE 4

Effects of Allotments in Reducing Central Cotton Acreage, from 1953 to 1954, and 1955

Cropland class intervals	Average cotton allotments by years; percentages of average cotton acres per farm, 1951-1953	
	under 1954 allotment	under 1955 allotment a/
	1	2
	percent	
1 - 20	125	96
21 - 60	77	59
61 - 100	69	53
101 - 220	70	54
221 - 420	67	51
421 - 660	70	53
661 - 1,100	71	54
1,101 + above	72	54
All farms	71	55

a/ Estimated.

The facts above measure the over-all impact of acreage allotments on cotton acres and cropland use in Central subarea between 1953 and 1955. In the latter year, farm operators had to find some alternative use for nearly half of the land they had planted to cotton on the average from 1951 to 1953. Farm size was an important factor in determining how this general adjustment affected the individual farmer. Information is available to indicate that cotton was the

most important field crop in Central subarea, and that its relative importance was greater on smaller units than on the larger ones. Thus, before allotments, cotton occupied 50 percent or more of the cropland on 80 acre and smaller farms against 25 percent on the largest operations and 37 percent on the units ranging from 661 to 1,100 acres (Table 3). Acreage allotments in 1955 required these allotment holders to divert to other uses amounts of land ranging from almost none on 1-20 acre units to 325 acres on the operations of 1,101 acres and larger.

The Analysis Models Represent Three Family Farm Sizes

We selected three sizes for detailed analysis; these included 80-, 160-, and 320-acre units, considering all land in the respective farms (actually farms within the class interval ranges of 61-100, 101-220, and 221-420 acres). One prime criterion in making these selections is that cotton dominates the cropping system, both before and following allotments. In addition, we found it necessary to set the "80-acre farm" as the minimum-sized unit for the reason that the acreages of cotton (and other crops) on the smaller operations were inadequate to justify full lines of even minimum capacity equipment. Farmers operating small units make heavy use of custom operation, but vary widely in which operations they hire done, and in the particular pieces of equipment that they own. Finally, part-time and farm-urban combinations occur frequently among operations smaller than 80 acres. We were not primarily concerned with such operations, but, instead, with farming units constituting the main support of the operator family.

We omitted all operations larger than the group centering on 320 acres (221-420 acres). This was for the dual reason that these larger units are relatively few in numbers (in spite of their total acreage), and that each of the smaller family farms, the 80-, 160-, and 320-acre sizes, included a larger group of units with similar over-all characteristics.

The aggregate ASC data cited above include all 1954 allotment holders, and provided complete information for the items that they cover. [1] They do not, however, furnish facts about crops other than cotton, either before or after allotments. We obtained this information from questionnaires returned by 230 cooperators in Madera County. Their replies regarding cropland, pre-allotment cotton (in 1953), and post-allotment cotton acreages agree in over-all tendencies with the more complete data, particularly for the farms of 420 acres and smaller (Table 5). The scarcity of information, because of the small number of replies, greatly lessens the usefulness of averages for the larger size groups.

Questionnaire returns provide tentative information on how Central cotton growers used the land they diverted from cotton in 1954; no data are available for 1955. More farmers increased barley than any other crop, with field corn in second place (Tables 6 and 7). Milo and alfalfa, each with 10 growers increasing acres, followed corn, although the miscellaneous group of "other crops" actually included 13 respondents who reported increases. Equally as important as the number of growers indicating crop acreage increases, is the fact that 44 out of 230 indicated that they fallowed additional land.

Changed use included 3,400 acres, or more than 50 percent of the total, shifted to barley, 1,150 to other grains, 1,180 to alfalfa and irrigated pasture, 500 to other crops, and 320 to fallow. These data indicate that Central cotton farmers had a very narrow range of choice in seeking alternatives for cotton. The major uses reported here as absorbing diverted acres all fall sharply below cotton in earnings on soils adapted to cotton. Fallowed land, of course, returns no earnings but, rather, requires added variable expense as well as fixed cost. We shall consider the information regarding alternative crops and their earnings more fully in a later section when we explore the earnings impact of allotments.

1/ The contraction, ASC, as used here and in succeeding pages, refers to the California state and county Agricultural Stabilization and Conservation Committee.

TABLE 5

Cotton Acreage in 1953, 1954, and 1955: Madera County

Cropland class intervals	Average acres per farm	Number of farms	1953		1954		1955 a/		Changes in acreage	
			total	average	total	average	total	average	1953 to 1954	1954 to 1955
	1	2	3	4	5	6	7	8	9	10
1 - 20	14.6	21	222	10.6	205	9.8	175	8.3	- 17	- 30
21 - 60	39.1	70	1,687	24.1	1,151	16.4	981	14.0	- 536	- 170
61 - 100	80.2	47	2,198	46.8	1,649	35.1	1,405	29.9	- 549	- 244
101 - 220	152.3	52	3,729	71.7	2,772	53.3	2,363	45.4	- 957	- 409
221 - 420	302.3	22	2,770	125.9	2,106	95.7	1,795	81.6	- 664	- 311
421 - 660	551.7	11	2,290	208.2	2,068	188.0	1,763	160.3	- 222	- 305
661 - 10,000	2,175.9	7	4,627	661.0	3,833	547.6	3,268	466.9	- 794	- 565
Total	185.6	230	17,523	76.2	13,784	59.9	11,750	51.1	-3,739	-2,034

a/ Estimated.

Source: Questionnaire returns, 1954.

TABLE 6

Crops Other Than Cotton in 1953 and 1954: Madera County

Cropland class interval	Average acres per farm	Number farms	Alfalfa			Irrigated pasture			Barley		
			Farms reporting	acres		Farms reporting	acres		Farms reporting	acres	
				total	average		total	average		total	average
	1	2	3	4	5	6	7	8	9	10	11
1953											
1- 20	14.6	21	2	15	7.5	5	41	8.2			
21- 60	39.1	70	26	450	17.3	33	382	11.6	2	48	24.0
61- 100	80.2	47	28	875	31.2	22	437	19.9	2	28	14.0
101- 220	152.3	52	35	1,765	50.4	31	1,050	33.9	6	185	30.8
221- 420	302.3	22	20	1,835	91.8	14	964	68.9	2	190	95.0
421- 660	551.7	11	8	1,090	136.2	7	855	122.1	5	900	180.0
661-10,000 a/	2,175.9	7	6	3,234	539.0	1	1,037	1,037.0	3	2,492	830.7
Total	185.6	230	125	9,264	74.1	113	4,766	42.2	20	3,843	192.2
1954											
1- 20	14.2	21	2	12	6.0	6	45	7.5			
21- 60	38.6	70	31	468	15.1	29	405	14.0	9	164	18.2
61- 100	82.9	47	30	1,663	55.4	18	522	29.0	8	208	26.0
101- 220	151.0	52	38	1,803	47.4	31	1,222	39.4	21	904	43.0
221- 420	296.0	22	19	1,783	93.8	16	1,224	76.5	8	408	51.0
421- 660	537.2	11	9	1,096	121.8	7	839	119.9	8	1,000	125.0
661-10,000 a/	2,175.9	7	6	3,097	516.2	3	1,035	345.0	5	4,561	912.2
Total	188.2	230	135	9,922	73.5	110	5,292	48.1	559	7,245	122.8

Cropland class interval	Milo			Field corn			Other crops			Fallow		
	farms reporting	acres		farms reporting	acres		farms reporting	acres		farms reporting	acres	
		total	per farm		total	per farm		total	average		total	average
	12	13	14	15	16	17	18	19	20	21	22	23
1953												
1- 20							2	10	5.0	5	18	3.6
21- 60	2	29	14.5				1	25	25.0	19	83	4.4
61- 100				1	30	30.0	1	15	15.0	17	186	10.9
101- 220	6	226	37.7	2	59	29.5	10	366	36.6	22	518	23.5
221- 420	3	127	42.3	3	84	28.0	6	355	59.2	11	285	25.9
421- 660	4	240	60.0				3	90	30.0	5	514	102.8
660-10,000 a/							3	3,147	1049.0	3	694	231.3
Total	15	622	41.5	6	173	28.8	26	4,008	154.2	82	2,298	28.0
1954												
1- 20				1	3	3.0				9	34	3.8
21- 60	1	15	15.0	6	68	11.3	6	115	19.2	37	300	8.1
61- 100	6	152	25.3	2	60	30.0	5	72	14.4	29	371	12.8
101- 220	8	351	43.9	4	59	14.8	14	555	39.6	27	407	15.1
221- 420	3	100	33.3	6	200	33.3	6	360	60.0	15	449	29.9
421- 660	4	130	32.5	1	160	160.0	5	232	46.4	5	379	75.8
661-10,000 a/	3	395	131.7	1	250	250.0	3	3,181	1060.3	4	679	169.8
Total	25	1,143	45.7	21	800	38.1	39	4,515	115.8	126	2,619	20.8

a/ Estimated.

Source: Questionnaire returns, 1954.

TABLE 7

Land Use Changes From 1953 to 1954: Crops Other Than Cotton, Madera County

Land use	Total increase in: farms reporting, 1953 to 1954	Total increase in: acres reported, 1953 to 1954	Percentage increase in acres reported, 1953 to 1954
	1	2	3
Alfalfa	10	658	7
Irrigated pasture	3	526	11
Barley	39	3,402	88
Milo	10	521	84
Field corn	15	627	362
Other crops	13	507	13
Fallow	44	321	54
Total	134	6,562	

Source: Questionnaire returns, 1954.

The questionnaire returns indicated that alfalfa and irrigated pasture ranked next to cotton in acres occupied prior to 1954 allotments. Both showed acreage increases after allotments, but little change in the percentage of growers reporting these crops. Farmers increased barley more sharply than any other crop in both number of growers and total acres. Important increases also occurred in both grain sorghum and field corn. More acres were fallowed after allotments.

We used these several sources of information in developing the cropping pattern, both before and after cotton allotments, for each of the farm analysis models (Table 8). Alfalfa and feed grains account for most of the land diverted from cotton on each of these models. Two alternative farm organizations are required for the 160-acre unit inasmuch as farm operators use both cropping plans extensively in Central subarea.

TABLE 8

Crops and Land Use on Farm Models, 1953-1955

80-acre Farm

Land use	1953	1954	1955
	1	2	3
	acres		
Cotton	42	28	23
Alfalfa	25	30	35
Field corn	5	5	15
Barley	--	10	--
Idle or fallow	2	1	1
Total cropland	74	74	74
Noncultivated	6	6	6
Total land	80	80	80

160-acre Farms

Land use	160-1 farm			160-2 farm		
	1953	1954	1955	1953	1954	1955
	1	2	3	4	5	6
	acres					
Cotton	75	50	41	75	50	41
Alfalfa	70	55	60	70	55	60
Irrigated pasture	--	40	40	--	--	--
Field corn	--	--	--	--	--	40
Barley	--	--	--	--	40[a]	--
Milo	--	--	--	--	40[a]	--
Idle or fallow	7	7	11	7	7	11
Total cropland	152	152	152	152	152	152
Noncultivated	8	8	8	8	8	8
Total land	160	160	160	160	160	160

[a] Milo and barley double-cropped.

320-acre Farm

Land use	1953	1954	1955
	1	2	3
	acres		
Cotton	130	87	72
Alfalfa	110	110	110
Irrigated pasture	35	35	40
Corn (ensilage)	--	20	60
Barley	--	30	40[a]
Idle or fallow	15	8	8
Total cropland	290	290	290
Noncultivated	30	30	30
Total land	320	320	320

[a] Forty acres of barley and corn double-cropped.

FARMERS ADJUSTED TO COTTON ALLOTMENTS BY CHANGING PRODUCTION PRACTICES AND INPUTS, AS WELL AS BY SHIFTING ACRES FROM COTTON TO OTHER USES

The farm organizations for the four analysis models we used to determine the earnings impact of acreage allotments represent fully-owned, owner-operated, or "family" units. Their soil resources are grades I and II according to the Storie Index, and all cropland is irrigated. We developed complete information about capital investments, production technology and practices, and inputs and yields for the several crops on these farms according to the facts supplied by farmer and farm service agency interviewees. These facts on farm organization and operation enabled us to calculate costs and gross receipts for each of our farm models. With this latter information, it was a simple matter to determine earnings before and after allotments by budget analysis.

Farmers made important adjustments after the 1954 cotton allotments, other than in the acres they planted to cotton and other crops. Practically all growers, recognizing that cotton is their most effective and important moneymaker, tried in every possible way to increase profits on the acres remaining after allotments for producing this crop. Thus, they increased cotton yields sharply. These gains resulted, to a considerable extent, from larger amounts of irrigation water and fertilizer. But, growers also used other practices not so readily seen or measured. They were more careful to insure that the acres actually planted to cotton were those with the highest profit potential; they rotated their land more effectively to lessen the occasions when cotton follows cotton; they timed performance for the various seedbed and cultural operations more carefully. The smaller number of acres in cotton facilitated this latter practice both because there were fewer acres on which a previous year's cotton crop interfered with preparing for a new cotton crop, and because it requires less time to perform each cultural operation on the reduced cotton acres.

The detailed financial analysis, in succeeding sections, of how cotton acreage allotments affected farm earnings reflects higher yields and price increases in larger gross receipts. Costs also show the impact of increased inputs and changed technology, so far as these expressed themselves in measurable amounts and costs. Thus, farm earnings can change after allotments due to changes in crops and acres, variations in inputs costs and yields, and price shifts.

INCREASED YIELDS AND PRICES FOR COTTON AND ALFALFA IN 1955 REDUCED 1953 LOSSES ON THE 80-ACRE FARM

Investments Remained Unchanged; Fixed Costs Rose Slightly; Variable Expenses and Total Farm Costs Declined

The typical 80-acre farm had the following current investments according to major kinds of capital items, excluding land:

Item	Investment (1955 prices)	Percent of total investment
Power	$ 4,420.00	40
Equipment	1,838.00	16
Irrigation system	4,013.00	37
Improvements	818.00	7
Total	$11,089.00	100
Per acre	138.61	

New replacement costs for this line of equipment would be $19,813 at 1957 prices (Table 9).

This farm had two W-1 (row crop, 1 plow drawbar capacity) tractors. One provided the capacity used for cotton, and the other the capacity needed for alfalfa and corn.

Equipment used exclusively for cotton was limited to one cotton trailer; the farm operator did not own a cotton picker or stalk cutter. Farm equipment used only for hay crops included a power mower and a side delivery rake. The operator rented the following equipment items:

Item	Used for:
Stalk cutter	Cotton
Ditcher	Cotton and corn
Scraper	Cotton and corn
Fertilizer attachment	Cotton and corn
Broadcaster	Alfalfa

He also hired custom service to perform several operations on cotton, alfalfa, and corn. These contract operations for cotton included thinning, weeding, dusting, and picking. He contracted seedbed preparation and harvesting for alfalfa hay and picking, shelling, and hauling for corn. Custom service enables the operators on 80-acre farms to substitute variable expense outlays for the heavy overhead costs of ownership.

TABLE 9

Physical Resources and Investments for Typical 80-acre Farm, 1955 Prices

Item	Size or capacity	Amount	New cost per unit	New cost total	Average investment a/ per unit	Average investment a/ total
	1	2	3	4	5	6
			dollars			
Land:						
Total	80 acres					
Total cultivated	74 acres					
Improvements:						
Tractor shed		1	500.00	500.00		250.00
Shop storage shed		1	1,000.00	1,000.00		500.00
Fuel storage - gas	550 gallons	1		135.00		67.50
Subtotal				1,635.00		817.50
Irrigation system:						
Pumping plant	15 h.p.; 500 g.p.m.	2	1,675.00	3,350.00	858.44	1,716.88
Well, casing	12" diameter; 90' lift	2x175'	4.15	1,452.50	2.08	726.25
Pipe	12"	2,640'	.80	2,112.00	.40	1,056.00
Stands	7' x 36"	2	63.00	126.00	31.50	63.00
Vents	7' x 8"	2	4.90	9.80	2.45	4.90
Alfalfa valves	12"	40	18.56	742.40	9.28	371.20
Siphons	1 1/2"	100	1.50	150.00	.75	75.00
Subtotal				7,942.70		4,013.23
Power:						
Wheel tractor - A	W-1	1		2,600.00		1,820.00
Wheel tractor - B	W-1	1		2,000.00		1,400.00
Pickup truck	1/2 ton	1		2,000.00		1,200.00
Subtotal				6,600.00		4,420.00
Equipment:						
Plow, 2 way	2-16"	1		550.00		275.00
Disk, offset	5' 3"	1		300.00		150.00
Disk, tandem	6'	1		400.00		200.00
Spiketooth harrow	4' section	3	30.00	90.00	15.00	45.00
Cultipacker	10'	1		325.00		162.50
Lister planter	2 row	1		350.00		175.00
Cultivator	2 row	1		350.00		175.00
Cotton trailer	5 bale	1		400.00		220.00
Power mower	7'	1		350.00		175.00
Side delivery rake	8'	1		520.00		260.00
Subtotal				3,635.00		1,837.50
Total				19,812.70		11,088.23

a/ $\frac{\text{New cost + Salvage value}}{2}$

No salvage values, except as follows:

W-1 tractor - A:	$1,040	5-bale cotton trailer:	$40
W-1 tractor - B:	$ 800		
Pickup truck:	$ 400	Pumping plant:	$80ea.

Irrigation water on this farm was pumped from two 500 gallon per minute wells and distributed by underground pipe.

The operator performed all tractor and truck driving, but hired additional part-time labor for irrigating and to plant cotton and corn. He used no family labor other than his own.

The production practices and per acre inputs are the same in 1955 as for 1953 with two exceptions: The operator increased the inputs of both water and fertilizer on his allotted cotton acres in 1955.

Production Costs Include Both Fixed and Variable Items

This analysis classifies and measures, separately, fixed costs related to owning property and other overhead obligations, and variable expenses representing outlays for materials, labor, and other similar current items. The kinds of overhead costs are as follows:

1. Depreciation on farm improvements, irrigation facilities, equipment, and alfalfa stands,
2. Interest on average investments in the above-listed property,
3. Taxes on real estate and other farm property used in production,
4. Insurance on improvements and certain facilities and equipment, and
5. Office expenses.

We included interest on investment as a cost in order to compare alternative methods of performing certain operations, such as cotton harvesting by custom operation or with owned equipment. Later, when measuring earnings, we removed interest on investment from gross costs and expenses, but considered it in calculating percentage profits.

Variable expenses included outlays for:

1. Electrical energy and fuel,
2. Repairs and lubrication,
3. Materials (fertilizer, insecticides, seed, baling wire, etc.),
4. Labor, and
5. Contract services and interest on operating capital.

We classified and summarized both fixed costs and variable expenses to make possible cost and earnings comparisons among cotton and other enterprises, in addition to determining total farm profits in 1953 and 1955. This method of analysis required us to proceed as follows with the main kinds of fixed costs: (1) allocate the several classes of fixed costs as they applied to each facility or piece of equipment and find the annual totals, (2) determine total hours or other units of annual use for each, and divide into annual fixed cost totals to find cost per unit, (3) apply these unit fixed costs to the hours or other units of use for each enterprise to find totals by enterprises. Some items, such as land taxes, could be charged directly to individual enterprises on a per acre basis. This also was true of the variable expenses such as materials. Others, like fuel and repairs, we were able to distribute according to hours use, as for the fixed costs.

The budget analysis used the same procedure to determine production costs for each crop. The cotton cost analysis, therefore, will serve to illustrate this method for all enterprises. We classified total costs as (1) fixed costs, or (2) variable expenses, and calculated them first on a per acre basis, and then for the entire number of acres in the enterprise for the 80-acre farm. Thus, we listed under fixed costs real estate taxes, office, improvements, power, equipment, and irrigation water costs per acre. Variable expenses follow below the fixed costs and include power, equipment, materials, labor, and contract items. Both fixed cost and variable expense subtotals appear in the

cotton production costs table, as well as the gross total of all costs and expenses. The subtotal for labor and the gross costs and expenses total include value of the operator's labor at going rates, just as though this had required cash outlays. The same reason applies here as for charging interest on investment as a fixed cost; this procedure permits more effective inter-enterprise comparisons.

Fixed Costs Remain Largely Unchanged in Short-term Adjustments

Real estate taxes, office expenses, and improvements.--Real estate taxes were $6.50 per acre in both 1953 and 1955. The total tax cost for the 80-acre farm was $520 annually; this amount was charged to crops on an acreage-weighted basis. [1]

Total office costs were $150 per year. Each crop is charged with this fixed cost also, in accordance with the percentage of total acres under cultivation occupied by the crop. [2]

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[1] The tax cost is allocated as follows:

Crop	Acres	Percent of total producing acres	Total tax costs ($)	Per acre tax cost ($)
	1	2	3	4
1953				
Cotton	42	58	301.60	7.18
Alfalfa	25	35	182.00	7.28
Corn	5	7	36.40	7.28
	72	100	520.00	
1955				
Cotton	23	32	166.40	7.23
Alfalfa	35	48	249.60	7.13
Corn	15	20	104.00	6.93
	73	100	520.00	

[2] Office expenses by crops is allocated as follows:

Crop	Acres	Percent of total producing acres	Total office cost ($)	Per acre office cost ($)
	1	2	3	4
1953				
Cotton	42	58	87.00	2.07
Alfalfa	25	35	52.50	2.10
Corn	5	7	10.50	2.10
	72	100	150.00	
1955				
Cotton	23	32	48.00	2.09
Alfalfa	35	48	72.00	2.06
Corn	15	20	30.00	2.00
	73	100	150.00	

Annual costs of improvements (tractor shed, shop, and fuel storage tank), were allocated in the manner described above. [1]

Power and equipment.--The fixed cost per acre for power and equipment items depends upon their annual total costs and hours of use (Table 10). We obtained fixed costs per unit of use (per hour for tractors and equipment and per mile for trucks) by dividing the annual fixed cost of each item by the annual use of the item, as outlined above. These fixed costs per unit of input plus variable unit costs make up total unit costs (Tables 11, 12, and 13).

Operators increased alfalfa acres and, therefore, total annual power and equipment hours in 1955. This increased use brought lower per acre fixed costs for one tractor, the mower, and rake. All other power and equipment items were used less in 1955, and their per acre fixed costs increased. The cotton acreage reduction would have increased total equipment fixed costs per acre more on the 80-acre unit if the operator had owned a cotton picker. [2]

Corn and cotton had comparable per acre requirements for most of the row-crop equipment. By planting corn on a part of his diverted acreage, the operator lessened the increase in per acre fixed costs of such equipment. However, he did not succeed entirely in preventing an increase in total farm per acre costs. The combined acreage of cotton and corn in 1955 was still not as large as the acreage in cotton alone in 1953.

Cotton was the only crop produced on this farm for which we were able to allocate direct use of the pickup truck. Farmers indicated that they normally

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[1] Improvements costs included depreciation, $63.50; repairs, $30.00; and an imputed interest charge on investment, $40.88, (total, $134.38).

[2] This study does not explore in detail the difference between total costs of owning certain equipment and renting or contracting the services performed with such equipment. The effects of acreage allotments on production costs are different, of course, for farms owning equipment and farms contracting services.

TABLE 10

Annual Power and Equipment Hours, 80-acre Farm; 1953 and 1955

Item	Cotton			Alfalfa			Corn			All crop total	
	per acre	total		per acre	total		per acre	total			
		1953 (42 acres)	1955 (23 acres)		1953 (25 acres)	1955 (35 acres)		1953 (5 acres)	1955 (15 acres)	1953	1955
	1	2	3	4	5	6	7	8	9	10	11
	hours										
Power:											
W-1 tractor - A	10.25	430.50	235.75							430.50	235.75
W-1 tractor - B				3.41	85.25	119.35	9.01	45.05	135.15	130.30	254.50
1/2 ton pickup truck										(7,500 miles)	
Equipment:											
Plow, 2w/2-16"	1.28	53.76	29.44				1.28	6.40	19.20	60.16	48.64
5' 3" offset disk	1.12	47.04	25.76	.30	7.50	10.50	1.12	5.60	16.80	60.14	53.06
6' tandem disk	1.20	50.40	27.60				1.20	6.00	18.00	56.40	45.60
8' spiketooth harrow	1.20	50.40	27.60	.16	4.00	5.60	1.20	6.00	18.00		
12' spiketooth harrow				.06	1.50	2.10				41.77[a]	36.23[a]
10' cultipacker	.27	11.34	6.21							11.34	6.21
2-row lister planter	1.06	44.52	24.38				1.06	5.30	15.90	49.82	40.28
2-row cultivator	4.32	181.44	99.36				4.05	20.25	60.75	201.69	160.11
5-bale cotton trailer	1.50	63.00	34.50							63.00	34.50
7' power mower				1.55	38.75	54.25				38.75	54.25
8' side delivery rake				1.45	36.25	50.75				36.25	50.75

[a] Total annual hours for 12' spiketooth harrow is 2/3 of 8' spiketooth harrow hours plus 12' spiketooth harrow hours.

drove their pickups 7,500 miles annually in farm business. We, therefore, allocated fixed and variable costs of operating the truck to the several crops. The cost of pickup use for hauling cotton is not charged separately to the cotton enterprise but is included in cotton's share of the total pickup cost. To allow for hauling cotton and the relative importance of the cotton enterprise on the farm, we considered a cotton acre twice as important as an acre of any other crop. We, therefore, charged each cotton acre double when allocating pickup costs. The 1953 calculation illustrates the allocation method. The 80-acre farm had 42 cotton acres, 25 alfalfa acres, and 5 corn acres in 1953. The total weighted acreage was 2 x 42 (cotton) plus 1 x 25 (alfalfa) plus 1 x 5 (corn), a sum of 144 acres. The total truck mileage assigned to cotton was $\frac{84}{114}$ x 7,500 or 5,526 miles, and the per acre mileage was 5,526 ÷ 42 or 132 miles. The per acre fixed cost of the pickup for cotton in 1953 was $ .06 per mile x 132 miles or $7.92 per acre. We followed this same method in distributing this cost item to each crop in each farm model.

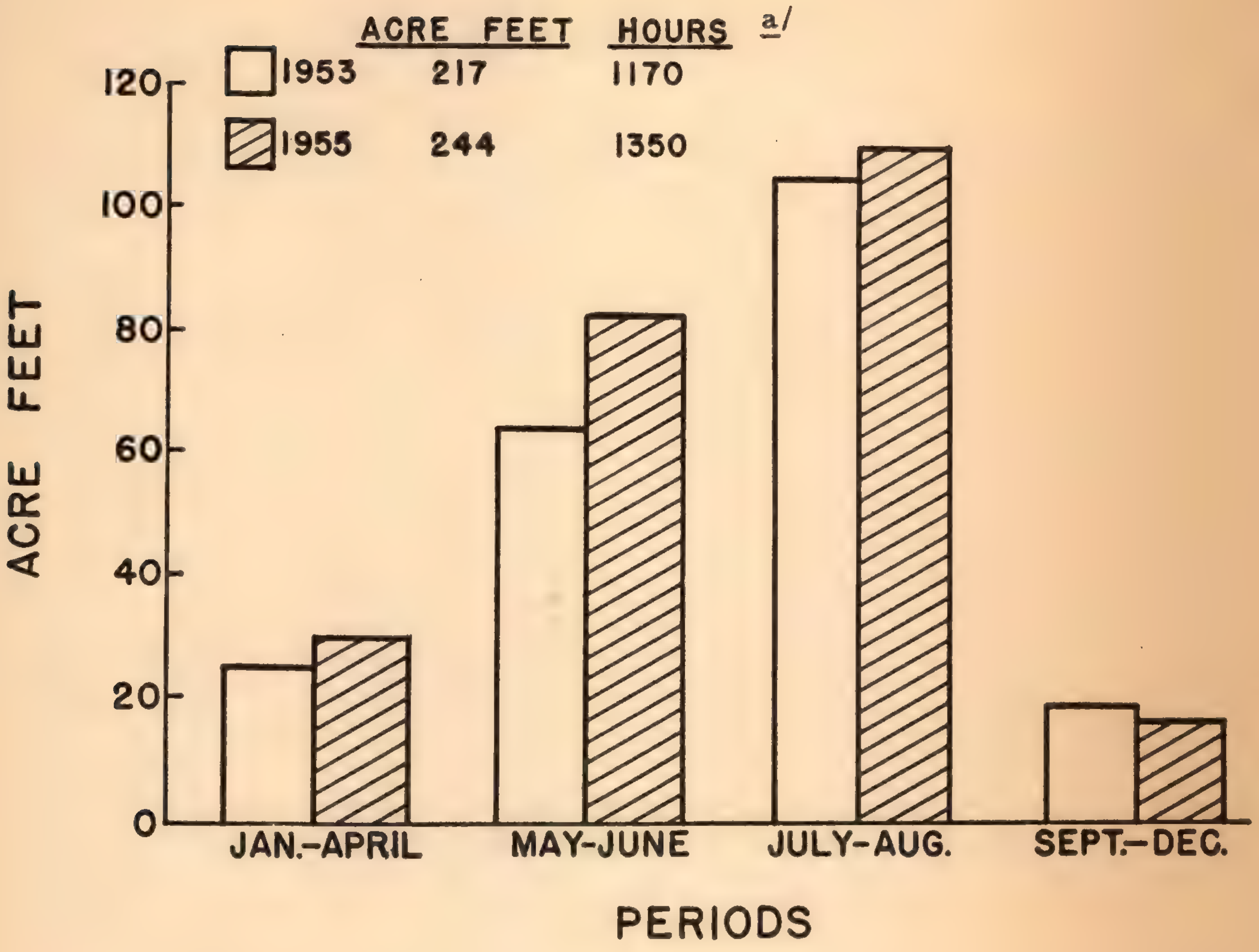
Irrigation water.--The 80-acre farm pumped 217 acre feet of water in 1953 and 244 acre feet in 1955 (Figure 3). Per acre applications of water were as follows:

Crop	1953	1955
	acre inches	
Cotton	31.2	36.0
Alfalfa	44.4	44.4
Corn	36.0	36.0

The changes in land use between 1953 and 1955 accounted for most of the increase in total water use. Alfalfa and corn both required more water per acre than cotton in 1953. After allotments, however, the operator applied an additional 4.8 acre inches of water on each allotted cotton acre.

The total fixed costs per acre foot of water (depreciation, interest, taxes, and insurance) decreased from $2.70 in 1953 to $2.40 in 1955 (Tables 11 and 13).

Figure 3. Irrigation Water Use, 80-acre Farm; 1953 and 1955



[a] Pumping hours obtained as follows:

$$\frac{\text{g.p.m. x hours pumped}}{450} = \text{total acre inches applied}$$

TABLE 11

Fixed Costs: Power, Equipment, and Irrigation Water, 80-acre Farm; 1953 and 1955

Item	Original cost	Life	Salvage value	Average investment a/	Annual noncash costs			Annual cash costs taxes and insur. d/	Total fixed costs
					depr. b/	int. c/	total		
	1	2	3	4	5	6	7	8	9
Power:	dollars	years	dollars						
W-1 tractor - A	2600	6	1040	1820	260.00	91.00	351.00	60.67	411.67
W-1 tractor - B	2000	6	800	1400	200.00	70.00	270.00	46.67	316.67
Pickup truck	2000	5	400	1200	320.00	60.00	380.00	54.00 e/	434.00
Subtotal					780.00	221.00	1,001.00	161.34	1,162.34
Equipment:									
Plow, 2w/2-16"	550	10		275	55.00	13.75	68.75	6.88	75.63
5' 3" offset disk	300	10		150	30.00	7.50	37.50	3.75	41.25
6' tandem disk	400	10		200	40.00	10.00	50.00	5.00	55.00
12' spiketooth harrow	90	15		45	6.00	2.25	8.25	1.12	9.37
10' cultipacker	325	10		163	32.50	8.15	40.65	4.08	44.73
2-row lister planter	350	10		175	35.00	8.75	43.75	4.38	48.13
2-row cultivator	350	10		175	35.00	8.75	43.75	4.38	48.13
5-bale cotton trailer	400	5	40	220	72.00	11.00	83.00	5.50	88.50
7' power mower	350	10		175	35.00	8.75	43.75	4.38	48.13
8' side delivery rake	520	10		260	52.00	13.00	65.00	6.50	71.50
Subtotal					392.50	91.90	484.40	45.97	530.37
Irrigation water:									
Pumping plant	3350	20	80	1715	163.50	85.75	249.25	82.49	331.74
Well & casing	1452	20		726	72.62	36.30	108.92	34.92	143.84
Pipeline	2248	30		1124	74.93	56.20	131.13	54.06	185.19
Alfalfa valves	742	30		371	24.75	18.55	43.30	17.85	61.15
Siphons	150	5		75	30.00	3.75	33.75	3.61	37.36
Subtotal					365.80	200.55	566.35	192.93	759.28
Total fixed costs, all items					1,538.30	513.45	2,051.75	400.24	2,451.99

(Continued on next page.)

Table 11 continued.

a/ $\frac{\text{Original cost + Salvage value}}{2}$

b/ $\frac{\text{Original cost - Salvage value}}{\text{Life}}$

c/ 5 percent x average investment.

d/ 3.3333 percent x average investment (power).
2.5 percent x average investment (equipment).
4.81 percent x average investment (irrigation system).

e/ Includes $25 license and $25 insurance.

Establishing an alfalfa stand.--Farmers who produce alfalfa must establish new stands in accordance with the rotation system used and the normal profitable life of the crop. Alfalfa stand costs are charged off as depreciation over the productive life of the crop. Thus, in this analysis, we distributed alfalfa stand cost over four years. In 1953, the 80-acre farm had 25 acres of alfalfa. The total cost for establishing this stand was $1,239. One-fourth of this cost, $310, was charged to annual alfalfa production cost.

Total Variable Expenses Declined About Nine Percent From 1953 to 1955

Power and equipment.--Variable costs on equipment include outlays for fuel, lubrication, and repairs. The annual repair costs for the tractor used for cotton production decreased between 1953 and 1955. Repair costs of all other power and equipment items were identical in 1953 and 1955 in spite of some variation between years in annual use. 1/

Materials.--The total variable expenses for irrigation water (lubrication, electrical power, and repairs) increased, but total variable expense did not increase in direct ratio to amount of water pumped. This was because:

1/ The relationships between tractor repair and tire costs and annual use are illustrated below:

Annual use (hours)	Annual repair and tire costs for:		
	W-1 tractors		W-2 tractors
	A	B	A
	1	2	3
0 - 350	$ 60	$ 72	$ 70
350 - 500	75	79	90
500 - 1,000	85	85	100
1,000 + over	140	132	165

These figures apply to all of the farm models. Repair costs are partly fixed and partly variable, i.e., they are "intermittently" variable as annual use changes.

Equipment repair costs remain the same throughout the analysis. These are not purely fixed costs, however, because they would not be incurred if the equipment remained idle throughout the season.

(1) repairs were constant over the range of plant use, and (2) because electrical energy prices per kilowatt-hour decrease with increases in thousands of kw-hr used per motor horsepower. The total variable cost per acre foot of water decreased from $3.64 in 1953 to $3.41 in 1955 (Tables 12 and 13).

The operator applied 325 pounds of ammonium sulfate (20.5 percent nitrogen) on each acre of cotton in 1953 and 333 pounds in 1955, thus slightly increasing fertilizer expense per acre. There were no changes between these years in the quantity of seed used per acre. Other practice changes that we were unable to measure may have had equal (or even greater) impact on yields. Thus, interviewees stressed the importance of fewer acres in cotton, with resulting improved rotations and more effective seedbed preparation.

Labor cost.--The operator's labor is charged as a variable expense at a rate of $1.00 per hour. Since the use of contract services for all crops was extensive, the cost of operator labor was not a high percentage of total variable expenses in either 1953 or 1955. The operator contributed 709 hours of labor in 1955 as against 806 hours in 1953. 1/ The total hired labor requirements for cotton increased in 1955 because additional irrigation water was applied. Cotton and corn planting are two-man operations. We charged the second man as hired labor.

The total operator labor cost charged to cotton includes three separate items: (1) the charge for tractor driving, (2) the cost for hauling cotton to the gin (1.5 hours of labor per acre for all farm models in both 1953 and 1955), and (3) the cost of the remaining truck driving time. We calculated the third

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1/ The total driving time includes, in addition to hours required to producing crops, the amortized share of labor required for establishing alfalfa stands. In 1953, for example, 41 hours of driving were required to establish 25 acres of alfalfa. One-fourth of this cost was added to the cost of producing alfalfa. In determining labor utilization for 1953, we added 10.25 hours, or one-fourth of these 41 hours of driving, to the total of operator labor time required for actual crop production.

TABLE 12

Variable Expenses: Power, Equipment, and Irrigation Water, 80-acre Farm
1953 and 1955

Item	1953			1955		
	Fuel & lube a/	Repairs	Total	Fuel & lube a/	Repairs	Total
	1	2	3	4	5	6
	dollars					
Power:						
W-1 tractor - A	172.20	70.00	242.20	106.36	60.00	166.36
W-1 tractor - B	71.66	72.50	144.16	123.39	72.50	195.89
Pickup truck	187.50	100.00	287.50	187.50	100.00	287.50
Subtotal			673.86			649.75
Equipment:						
Plow, 2w/2-16"		82.50	82.50		82.50	82.50
5' 3" offset disk		45.00	45.00		45.00	45.00
6' tandem disk		60.00	60.00		60.00	60.00
12' spiketooth harrow		1.80	1.80		1.80	1.80
10' cultipacker		32.50	32.50		32.50	32.50
2-row lister planter		35.00	35.00		35.00	35.00
2-row cultivator		70.00	70.00		70.00	70.00
5-bale cotton trailer		12.00	12.00		12.00	12.00
7' power mower		35.00	35.00		35.00	35.00
8' side delivery rake		52.00	52.00		52.00	52.00
Subtotal			425.80			425.80
	Lube & power b/			Lube & power b/		
Irrigation water:						
Pumping plant	706.46	67.00	773.46	749.24	67.00	816.24
Pipeline		11.24	11.24		11.24	11.24
Alfalfa valves		3.71	3.71		3.71	3.71
Subtotal			788.41			831.19
Total variable expenses, all items			1,888.07			1,906.74

a/ W-1 (A): $ .40 per hour,
W-1 (B): $ .55 per hour,
Pickup: $ .025 per mile.

b/ Power and lube costs obtained as follows:
Power cost = sum of following charges:
(1) Service charge ($96 for 15 h.p. motor)
(2) First 1,000 kw-hrs @ $ .014 per h.p.
(3) Second 1,000 kw-hrs @ $ .0085 per h.p.
(4) Remaining kw-hrs @ $ .006 per h.p.
Lube cost = 1 percent of power cost.

$$\text{Kw-hrs} = \frac{\text{Rated h.p. x 100 x .746 x hrs. pumped}}{\text{Motor efficiency (65 percent)}}$$

TABLE 13

Unit Costs [a]: Power, Equipment, and Irrigation Water, 80-acre Farm; 1953 and 1955

Item	Unit	Fixed cost per unit		Variable expense per unit		Total cost per unit	
		1953	1955	1953	1955	1953	1955
	1	2	3	4	5	6	7
		dollars					
Power:							
W-1 tractor - A	hour	.96	1.74	.56	.71	1.52	2.45
W-1 tractor - B	hour	2.43	1.24	1.11	.77	3.54	2.01
Pickup truck	mile	.06	.06	.04	.04	.10	.10
Equipment:							
Plow, 2w/2-16"	hour	1.26	1.55	1.37	1.70	2.63	3.25
5' 3" offset disk	hour	.68	.78	.75	.85	1.43	1.63
6' tandem disk	hour	.98	1.20	1.06	1.32	2.04	2.52
12' spiketooth harrow	hour	.23	.26	.04	.05	.27	.31
10' cultipacker	hour	3.94	7.21	2.87	5.23	6.81	12.44
2-row lister planter	hour	.97	1.19	.70	.87	1.67	2.06
2-row cultivator	hour	.24	.30	.35	.44	.59	.74
5-bale cotton trailer	hour	1.41	2.56	.19	.35	1.60	2.91
7' power mower	hour	1.25	.89	.90	.64	2.15	1.53
8' side delivery rake	hour	1.97	1.41	1.44	1.02	3.41	2.43
Irrigation water:	acre foot	3.50	3.12	3.64	3.41	7.14	6.53

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[a] Rounded.

item at the rate of one hour of driving per 40 miles. The total operator labor cost charged to all other crops includes only costs for tractor driving and the allocated costs for truck driving.

Contract services.--Payments for custom services accounted for 55 percent of the total variable expenses for producing cotton in 1953. This percentage increased slightly in 1955 due to the increase in harvesting and processing costs accompanying increased cotton yields. Contract costs accounted for 37 percent of the alfalfa variable expenses and 18 percent of those for producing corn in 1953; these expenses increased for both crops in 1955.

Total Farm Production Costs Declined Because Cotton Costs Dropped More Than Those for Alfalfa, and Corn Increased

Total fixed costs for the farm, other than the cost of establishing alfalfa stands, remained the same in 1955 as in 1953. There was no change in either farm inventory items or prices involved in fixed costs. Fixed costs by cost category were as follows: [1]

Item	Total fixed cost
Power	$1,162.34
Equipment	530.37
Irrigation system	759.28
Real estate taxes	520.00
Office expenses	150.00
Improvements	134.38
Total	$3,256.37
Per acre	40.70

All production costs are charged to the three crops grown on the 80-acre farm: cotton, alfalfa, and field corn. Between 1953 and 1955, the total per acre variable expenses for producing cotton increased from $164 to $187 (Table 14). Over half of the increase was due to higher per acre costs for picking, ginning, insurance and storage. These increases, in turn, reflect increased yields.

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[1] Includes $554.33 as an imputed charge for interest on investment or "opportunity cost" for the operator's capital currently invested in power, equipment, irrigation facilities, and improvements. (See Table 9).

TABLE 14

Input Costs by Crops and Total Farm, 80-acre Farm; 1955 and 1953

	1955						
	Cotton (23 acres)		Alfalfa (35 acres)		Field corn (15 acres)		
Item	per acre	total	per acre	total	per acre	total	Total farm
	1	2	3	4	5	6	7
	dollars						
Fixed:	60.39	1,389.00	45.97	1,608.94	42.83	642.53	3,640.47
Variable:							
Power	13.18	303.14	5.28	184.80	9.91	148.65	636.59
Equipment	10.60	243.80	2.48	86.80	8.04	120.60	451.20
Materials	23.72	545.56	12.65	442.75	28.06	420.90	1,409.21
Labor	32.36	744.38	24.26	849.10	27.55	413.25	2,006.73
Contracts	107.26	2,466.90	28.88	1,010.80	20.09	301.40	3,779.10
Total variable	187.12	4,303.78	73.55	2,574.25	93.65	1,404.80	8,282.83
Total cost	247.51	5,692.78	119.52	4,183.19	136.48	2,047.33	11,923.30
	1953						
	(42 acres)		(25 acres)		(5 acres)		
Fixed:	46.60	1,957.12	52.51	1,312.80	53.20	266.01	3,535.93
Variable:							
Power	10.77	452.34	5.82	145.50	12.46	62.30	660.14
Equipment	8.32	349.44	3.48	87.00	6.65	33.25	469.69
Materials	22.65	951.30	13.45	336.25	28.71	143.55	1,431.10
Labor	29.68	1,246.43	23.93	598.30	27.22	136.11	1,980.84
Contracts	92.56	3,887.63	27.57	689.25	18.98	94.91	4,671.79
Total variable	163.98	6,887.14	74.25	1,856.30	94.02	470.12	9,213.56
Total cost	210.58	8,844.26	126.76	3,169.10	147.22	736.13	12,749.49

The total per acre variable expenses for alfalfa and corn decreased slightly between 1953 and 1955, even though the inputs for these crops did not change in 1955. We also used the same prices for seed, labor, and similar items in both years. Cost variations, consequently, reflect changes in the total farm resource use.

Gross Receipts and Earnings Increased While Costs Declined

Total gross receipts for 1955 were $542 above those for 1953, despite the reduced cotton acreage (Table 15). This increase resulted from higher cotton and alfalfa yields and higher cotton lint and alfalfa hay prices. Cottonseed prices, on the other hand, declined between these years, but not enough to offset the gain in cotton lint receipts. Although corn yield increased, the price dropped enough to offset this gain, and per acre gross receipts declined by $3.00.

Had no cotton or alfalfa yield or price changes occurred between 1953 and 1955, total gross receipts in 1955 would have been $10,318, $2,551 lower than the actual amount. Increased cotton returns accounted for 59 percent of this gain. The gains in cotton and alfalfa far outweighed the effects of decreased corn returns. We made calculations to show the net effects of various possible yield and price changes for cotton and alfalfa based on comparisons

with actual 1953 and 1955 conditions. We present our results in the following text table:

Conditions	Gross receipts in 1955 a/	Reduction from observed gross receipts
	1	2
	dollars	
Observed change in YIELD and PRICE of:		
Cotton and alfalfa	12,869	
No change in YIELD and PRICE of:		
Cotton and alfalfa	10,318	2,551
Cotton alone	11,354	1,515
Alfalfa alone	11,833	1,036
No change in PRICE of:		
Cotton and alfalfa	11,493	1,376
Cotton alone	12,340	529
Alfalfa alone	12,022	847
No change in YIELD of:		
Cotton and alfalfa	11,567	1,302
Cotton alone	11,795	1,074
Alfalfa alone	12,641	228

a/ Rounded.

Total costs for the farm, less interest on land, decreased $826 between 1953 and 1955, while total gross receipts increased $542. Gross receipts-minus-costs were $1,368 higher in 1955 than in 1953 (Tables 14 and 15).

Per acre	Cotton		Alfalfa		Corn	
	1953	1955	1953	1955	1953	1955
	1	2	3	4	5	6
	dollars					
Gross receipts	214.40	280.27	113.40	143.00	97.50	94.50
Variable expenses a/	163.98	187.12	74.25	73.55	94.02	93.65
Balance	50.42	93.15	39.15	69.45	3.48	.85
Fixed costs	46.60	60.39	52.51	45.97	53.20	42.83
Balance	3.82	32.76	-13.36	23.48	-49.72	-41.98

a/ These variable expenses include the allocated pickup truck costs with accompanying labor, Social Security, and interest charges. If these costs are removed, the variable expense figures would be as follows:

Crop	1953	1955
Cotton	$155.69	$177.38
Alfalfa	70.02	68.52
Corn	89.72	88.55

TABLE 15

Gross Receipts, Costs, and Earnings by Crops and Total Farm, 80-acre Farm; 1955 and 1953

Item	Cotton		Alfalfa	Field corn	Total farm
	lint	seed			
	1	2	3	4	5
1955					
Acres	23		35	15	73
Yield	1.5 bales[a]	.638 tons[b]	5.5 tons	35 cwt.	
Production	34.5 bales	14.66 tons	192.5 tons	525 cwt.	
Price	$167.30/bale	$46.00/ton	$26.00/ton	$2.70/cwt.	
	$5,771.85	$674.36			
Gross receipts	$6,446.21		$5,005.00	$1,417.50	$12,868.71
Costs (less land)	5,692.78		4,183.19	2,047.33	11,923.30
Receipts minus costs	$ 753.43		$ 821.81	$ -629.83	$ 945.41
Land interest ($300/acre c/ at 5%)	397.50		551.25	251.25	1,200.00
Net	$ 355.93		$ 270.56	$ -881.08	$ -254.59
Add:					
Interest on fixed capital (incl. land)					1,754.33
Operator's labor d/					708.73
Net farm income					$ 2,208.47
Less:					
Operator's labor (imputed)					2,500.00
Return to capital and management					$ -291.53
Rate earned on investment					-.83%
1953					
Acres	42		25	5	72
Yield	1.25 bales[a]	.531 tons[b]	5.25 tons	30 cwt.	
Production	52.5 bales	22.31 tons	131.25 tons	150 cwt.	
Price	$148.99/bale	$53.00/ton	$21.60/ton	$3.25/cwt.	
	$7,821.98	$1,182.43			
Gross receipts	$9,004.41		$2,835.00	$ 487.50	$12,326.91
Costs (less land)	8,844.26		3,169.10	736.13	12,749.49
Receipts minus costs	$ 160.15		$ -334.10	$-248.63	$ -422.58
Land interest ($300/acre c/ at 5%)	690.00		405.00	105.00	1,200.00
Net	$ -529.85		$ -739.10	$-353.63	$-1,622.58
Add:					
Interest on fixed capital (incl. land)					1,754.33
Operator's labor d/					805.72
Net farm income					$ 937.47
Less:					
Operator's labor (imputed)					2,500.00
Return to capital and management					$-1,562.53
Rate earned on investment					-4.45%

[a] 500 pound bales (lint: 478 pounds; bagging and ties: 22 pounds).

[b] 850 pounds or 0.425 tons of seed per bale of lint.

[c] Bare land was valued at an arbitrary figure of $300 per acre. This value was estimated from available rental and assessment values and is the figure used for Grades I and II based on all farm models. We found it impossible to obtain a realistic current market value of land in Central subarea since property does not change hands frequently enough to suggest an average sale value. We do not present the $300 estimate as a precise market value. Readers should not interpret it as such.

[d] Includes total operator's labor used in producing crops and in establishing 1/4 of total alfalfa acreage.

Per acre gross receipts from cotton, corn, and alfalfa covered their respective per acre variable expenses before and after allotments. The "balance" item indicates more favorable per acre returns in 1955 for cotton and alfalfa primarily because of price and yield increases. Corn was the least profitable of the three crops; alfalfa and corn were not as profitable as cotton in either 1953 or 1955.

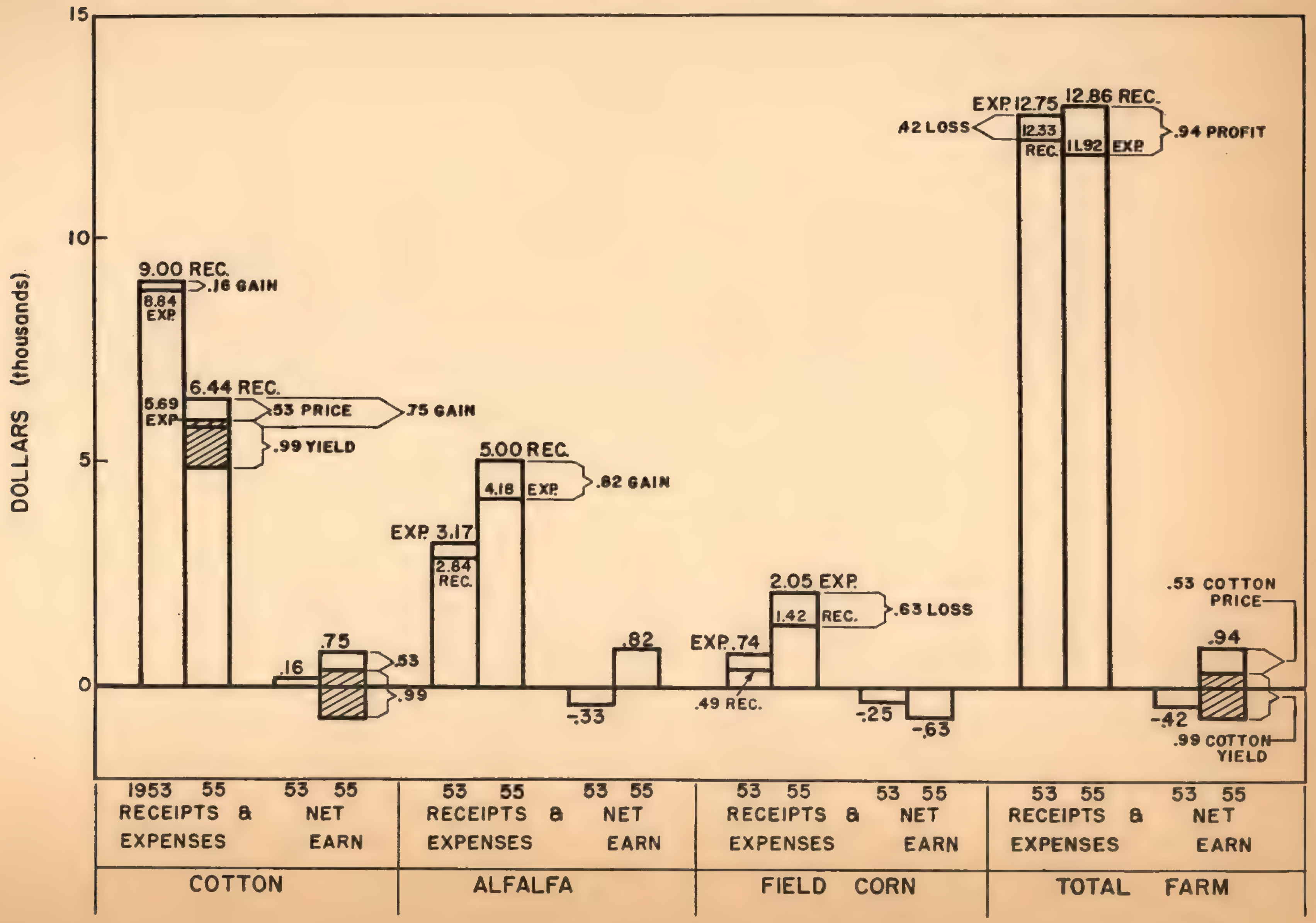
Gross receipts-minus-costs, excluding interest on farm land, amounted to $-423 in 1953 and $945 in 1955 (Figure 4). The costs deducted from gross receipts to determine these figures include: (1) all cash costs, (2) depreciation on power, equipment, irrigation facilities, and improvements, (3) an imputed interest charge on the capital invested in power, equipment, irrigation facilities and improvements, and (4) wages for the operator's actual labor. The imputed interest charge for power, equipment, and irrigation facilities is calculated at 5 percent of the average investment.

We obtained net receipts by deducting from gross receipts-minus-costs, the interest on use of estimated capital invested in land. Net receipts is an intermediate step in determining net farm income. It is necessary due to our procedure of charging interest on investment and operator labor as costs in determining service costs and enterprise earnings. This value for the 80-acre farm was $-1,623 in 1953 and $-255 in 1955.

Net farm income constitutes the return to the operator for his labor, capital, and management. It represents total gross receipts less (1) all cash costs, and (2) depreciation. We obtained this measure restoring to farm returns total interest on fixed capital, including land, and the value of the operator's actual labor. Net farm income on this farm was $937 in 1953 and $2,208 in 1955.

Net cash income (total cash receipts less total cash expenses) is another measure of farm earnings important to all operators, particularly those with

Figure 4. Changes in Gross Receipts, Expenses, and Net Returns on 80-acre Farm in Central San Joaquin Valley, 1953-1955 (in thousands dollars).



Source: Calculated from survey data.

nondeferrable financial obligations. [1] Net cash income was $2,621 in 1953 and $3,841 in 1955.

If we assume that the operator could have earned $2,500 a year in an alternative occupation, we can deduct $2,500 from net farm income to show the operator's return to capital and management (profit). This return was $-1,563 in 1953 and $-292 in 1955. We also expressed profit as the rate earned on investment. To do so, we divided the amount of profit by the sum of average farm investments. The 80-acre farm had capital earnings of -4.4 percent in 1953 and -0.8 percent in 1955. [2]

If the yield increases for cotton and alfalfa had not occurred between 1953 and 1955, the rate earned on investment in 1955 would have been -4.3 percent. Furthermore, if neither prices nor yields of these two crops had increased, the rate would have dropped to -8.1 percent.

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[1] Such obligations of the owner-operator, tenant, or landlord, include interest and principal payments on borrowed, fixed capital.

[2] Net farm income and profit reflect actual dollar returns, and reflect both size and efficiency. The rate earned on investment is useful for indicating total farm efficiency and comparing different-sized business organizations.

ON 160-ACRE FARMS, GROWERS PLANTING FIELD CORN INCREASED PROFITS SLIGHTLY; THOSE SHIFTING TO PASTURE HAD SMALL DROP IN EARNINGS

The two organizations used to represent the 160-acre farm size, identical as to soil type and water availability, had the same investments, costs, and returns in 1953. Their crop organizations that year included 75 acres of cotton, 70 acres of alfalfa, and 7 acres of idle or fallow land.

The operators on these farm models (160-1 and 160-2) differed, however, in how they adjusted land use to cotton allotments. In 1955, both reduced cotton acreage to 41 acres and alfalfa to 60 acres, while increasing idle land to 11 acres. The operator on the 160-1 unit devoted the remaining 40 cropland acres to irrigated pasture, while the one on the 160-2 farm planted his remaining acres to field corn.

Capital Investments and Fixed Costs Remained Unchanged

Capital investments for the 160-acre farm models, as those for the 80, were the same in 1955 and 1953; cotton acreage allotments caused no change in inventories (Table 16). Total investments by classes were as follows:

Item	Investment (1955 prices)	Percent of total investment
Power	$ 5,120.00	23
Equipment 1/	8,698.00	39
Irrigation system	7,280.00	32
Improvements	1,418.00	6
Total	$22,516.00	100
Per acre	140.73	

Power units typically found on farms in this class included two rowcrop tractors (one W-1 and one W-2) and one 1/2-ton pickup truck. The 80- and 160-acre farms differed in their equipment inventories, however. The inventory for

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1/ Includes $262.50 investment in equipment which was typically found on farms of this size, but not used in 1953 or 1955.

TABLE 16

Physical Resources and Investments for Typical 160-acre Farms 1955 Prices

Item	Size or capacity	Amount	New cost		Average investment a/	
			per unit	total	per unit	total
	1	2	3	4	5	6
			dollars			
Land:						
Total	160 acres					
Total cultivated	152 acres					
Improvements:						
Tractor shed		1		700.00		350.00
Barn and storage		1		2,000.00		1,000.00
Fuel storage - gas	550 gallons	1		135.00		67.50
Subtotal				2,835.00		1,417.50
Irrigation system:						
Pumping plant	20 h.p.; 800 g.p.m.	2	2,700.00	5,400.00	1,383.75	2,767.50
Well, casing	14" diameter; 90' lift	2x175'	5.00	1,750.00	2.50	875.00
Pipe	14"	5,280'	.90	4,752.00	.45	2,376.00
Stands	7' x 36"	4	63.00	252.00	31.50	126.00
Vents	7' x 8"	8	4.90	39.20	2.45	19.60
Alfalfa valves	12"	100	18.56	1,856.00	9.28	928.00
Siphons	3/4" - 2"	250	1.50	375.00	.75	187.50
Subtotal				14,424.20		7,279.60
Power:						
Wheel tractor	W-1	1		2,600.00		1,820.00
Wheel tractor	W-2	1		3,000.00		2,100.00
Pickup truck	1/2 ton	1		2,000.00		1,200.00
Subtotal				7,600.00		5,120.00
Equipment:						
Plow, 2 way	2-16"	1		550.00		275.00
Chisel b/	8'	1		525.00		262.50
Disk, offset	7 1/2'	1		650.00		325.00
Disk, tandem	6'	1		400.00		200.00
Spiketooth harrow	4' section	4	30.00	120.00	15.00	60.00
Cultipacker	12'	1		380.00		190.00
Lister planter	4-row	1		550.00		275.00
Cultivator	4-row	1		1,000.00		500.00
Fertilizer attachment	2-row	1		100.00		50.00
Cotton picker	1-row	1		8,700.00		5,220.00
Cotton trailer	6-bale	3	450.00	1,350.00	247.50	742.50
Stalk cutter	2-row	1		325.00		162.50
Power mower	7'	1		350.00		175.00
Side delivery rake	8'	1		520.00		260.00
Subtotal				15,520.00		8,697.50
Total				40,379.20		22,514.60

(Continued on next page.)

Table 16 continued.

a/ Average investment for all items except land.

$$\frac{\text{New cost - Salvage value}}{2}$$

No salvage values, except as follows:
W-1 tractor: $1,040
W-2 tractor: $1,200
Pickup truck: $400
1-row cotton picker: $1,740
6-bale cotton trailer: $135 each

b/ Standby equipment owned but not used in 1953 or 1955.

the larger farm included a one-row cotton picker, accounting for $5,220 (or 60 percent) of the total equipment investment. The 160-acre farm also had a fertilizer attachment and a stalk cutter for cotton. The remaining equipment items on the 160-acre farms were comparable in kind to those of the smaller organization, although the size was larger for several items.

Interviews with farmers indicated that certain equipment items were usually owned but were not used on cotton farms in either 1953 or 1955. When such equipment is not fully depreciated, it incurs annual fixed costs. Farmers elect to own certain nonused, but operative, equipment as a hedge against crop loss. Such can result from untimely failure of equipment currently employed, or from unsatisfactory contract work arrangements. The operator ordinarily has considered selling or trading in his nonused equipment but does neither because he believes that the annual fixed costs of owning "standby" equipment is less than potential crop loss. Technological changes in farm equipment, occurring in the past decade, account in part for nonused equipment on many farms. The older, and frequently the smaller pieces of equipment, serve only a standby function. Nonused equipment is carried in the budget as a cost item if it still represents invested capital.

The 160-acre farm operators rented the following pieces of equipment:

Item	Used in producing:
Broadcaster	Alfalfa and irrigated pasture
Ditcher	Cotton and corn
Scraper	Cotton and corn
Fertilizer spreader	Irrigated pasture (160-2 only)

Two wells, each with an 800 gallon per minute pumping plant, provided irrigation water on the 160-acre farms. The operators distributed irrigation water with an underground pipeline system.

Contract services for alfalfa and corn included most of the seedbed preparation and harvesting operations. The 160-acre operators, owning harvesters,

did not contract cotton picking, but did contract cotton defoliation.[1] The 160-1 operator also had seedbed preparation for irrigated pasture done under contract.

Inputs of water and fertilizer on cotton acres increased after allotments; all other measurable practices remained the same. The 160-acre operators applied 300 pounds of ammonium sulfate per acre in 1953, and 333 pounds in 1955. Water application on cotton acres increased from 31.2 to 36.0 acre inches per acre.

Fixed and Variable Production Costs Reflect Changes in Cropping Systems and Production Methods

Real estate taxes, office costs, and improvements.--Both 160-acre farms reduced their total acreage under cultivation from 145 acres in 1953 to 141 acres in 1955. Real estate taxes, at $6.50 per acre, totaled $1,040 for the farm; office expenses were $225 annually, and the cost of improvements amounted to $228.[2] These costs were charged to each crop according to the percentage of total producing acres occupied by the crop.

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[1] Defoliation is the practice of removing leaves from the cotton plant with the use of chemical defoliants.

[2] Improvements: tractor shed, barn and storage, and fuel storage tank. Improvement costs were as follows: Depreciation, $103.50; interest, $70.88; repairs, $54.00.

Tax cost is allocated as follows:

160-1 and 160-2 Farms				
Crop	Acres	% of total producing acres	Total tax costs ($)	Per acre tax cost ($)
	1	2	3	4
1953				
Cotton	75	52	540.80	7.21
Alfalfa	70	48	499.20	7.13
	145	100	1,040.00	
1955				
Cotton	41	29	301.60	7.36
Alfalfa	60	43	447.20	7.45
(160-1)-Pasture & (160-2)-Corn	40	28	291.20	7.28
	141	100	1,040.00	

The same acreage ratios are used to allocate office and improvement costs.

Power and equipment.--Power and equipment requirements were the same for the two 160-acre farms in 1953 (Tables 17 & 18). Total hours of use for the two tractors and for many equipment items differed between farms in 1955, however, because the irrigated pasture on the 160-1 acre farm and corn on the 160-2 acre farm had different power and equipment requirements. Cotton and alfalfa equipment requirements were the same for each farm. The cotton picker was used a total of 208 hours in 1953 on both farms, but total use decreased to 114 hours in 1955.

Tractor use hours declined on both farms between 1953 and 1955. The decrease was less on the 160-2 farm, because corn requires more tractor hours per acre than irrigated pasture, and this same reason applies to equipment. The 160-2 farm had 75 cotton acres in 1953 as against a total of 81 acres devoted to cotton and corn in 1955. Total annual use of equipment items shared by cotton and corn increased, therefore, between 1953 and 1955. In contrast, the 160-1 farm experienced a decline in annual use of all equipment, other than the tandem disk, harrow, and power mower.

The fixed costs per hour of use in 1955 were higher than in 1953 for all of the items which decreased in annual use between these years (Tables 19 and 20). The most striking increase in fixed costs per hour occurred for the cotton picker. The annual fixed cost of owning the picker was $1,827, or 64 percent of the total equipment fixed cost. The fixed cost per hour of use increased from $8.76 in 1953 to $16.03 in 1955 (Table 21). Each crop was charged with the fixed costs of power and equipment in accordance with its use of these items.

We assigned annual pickup truck use of 10,000 miles to crops in the same manner as described for the 80-acre farm.

Irrigation water.--The 160-acre farms pumped 454 acre feet of water in 1953 (Figure 5). In 1955, the water use increased to 545 acre feet on the 160-1 farm and 465 acre feet on the 160-2 farm. This increase on the latter farm is explained by the high water requirements of irrigated pasture and by

TABLE 17

Annual Power and Equipment Hours, 160-1 Farm; 1953 and 1955

Item	Cotton			Alfalfa			Irrigated pasture		All crop total	
	per acre	total 1953 (75 acres)	total 1955 (41 acres)	per acre	total 1953 (70 acres)	total 1955 (60 acres)	per acre	total 1955 (40 acres)	1953	1955
	1	2	3	4	5	6	7	8	9	10
	hours									
Power:										
W-1 tractor	1.00	75.00	41.00	3.00	210.00	180.00	.92	36.80	285.00	257.80
W-2 tractor	9.45	708.75	387.45	.47	32.90	28.20	1.24	49.60	741.65	465.25
Pickup truck									(10,000 miles)	
Equipment:										
Plow, 2w/2-16"	.90	67.50	36.90						67.50	36.90
7 1/2' offset disk	.72	54.00	29.52	.37	25.90	22.20	.19	7.60	79.90	59.32
6' tandem disk	1.00	75.00	41.00				1.00	40.00	75.00	81.00
8' spiketooth harrow				.10	7.00	6.00	1.05	42.00		
16' spiketooth harrow	.18	13.50	7.38	.04	2.80	2.40	.02	.80	19.80[a]	34.58[a]
12' cultipacker	.20	15.00	8.20						15.00	8.20
4-row lister planter	.63	47.25	25.83						47.25	25.83
4-row cultivator	2.94	220.50	120.54						220.50	120.54
2-row fertilizer attachment	.64	48.00	26.24						48.00	26.24
1-row cotton picker	2.78	208.50	113.98						208.50	113.98
6-bale cotton trailer	1.50	112.50	61.50						112.50	61.50
2-row stalk cutter	.50	37.50	20.50						37.50	20.50
7' power mower				1.55	108.50	93.00	.62	24.80	108.50	117.80
8' side delivery rake				1.45	101.50	87.00			101.50	87.00

[a] Total annual hours for 16' spiketooth harrow is 1/2 of 8' spiketooth harrow hours plus 16' spiketooth harrow hours.

TABLE 18

Annual Power and Equipment Hours, 160-2 Farm; 1953 and 1955

Item	Cotton			Alfalfa			Corn		All crop total	
		total			total			total		
	per acre	1953 (75 acres)	1955 (41 acres)	per acre	1953 (70 acres)	1955 (60 acres)	per acre	1955 (40 acres)	1953	1955
	1	2	3	4	5	6	7	8	9	10
	hours									
Power:										
W-1 tractor	1.00	75.00	41.00	3.00	210.00	180.00	.50	20.00	285.00	241.00
W-2 tractor	9.45	708.75	387.45	.47	32.90	28.20	5.40	216.00	741.65	631.65
Pickup truck									(10,000 miles)	
Equipment:										
Plow, 2w/2-16"	.90	67.50	36.90				.90	36.00	67.50	72.90
7 1/2' offset disk	.72	54.00	29.52	.37	25.90	22.20	.72	28.80	79.90	80.52
6' tandem disk	1.00	75.00	41.00				.90	36.00	75.00	77.00
8' spiketooth harrow				.10	7.00	6.00				
16' spiketooth harrow	.18	13.50	7.38	.04	2.80	2.40	.18	7.20	19.80[a]	19.98[a]
12' cultipacker	.20	15.00	8.20						15.00	8.20
4-row lister planter	.63	47.25	25.83				.64	25.60	47.25	51.43
4-row cultivator	2.94	220.50	120.54				2.26	90.40	220.50	210.94
2-row fertilizer attachment	.64	48.00	26.24				.64	25.60	48.00	51.84
1-row cotton picker	2.78	208.50	113.98						208.50	113.98
6-bale cotton trailer	1.50	112.50	61.50						112.50	61.50
2-row stalk cutter	.50	37.50	20.50						37.50	20.50
7' power mower				1.55	108.50	93.00			108.50	93.00
8' side delivery rake				1.45	101.50	87.00			101.50	87.00

a/ Total annual hours for 16' spiketooth harrow is 1/2 of 8' spiketooth harrow hours plus 16' spiketooth harrow hours.

TABLE 19

Fixed Costs: Power, Equipment, and Irrigation Water, 160-acre Farms; 1953 and 1955

Item	Original cost	Life	Salvage value	Average invest- ment a/	Annual noncash costs			Annual cash costs taxes and insur. d/	Total fixed costs
					depr. b/	int. c/	total		
	1	2	3	4	5	6	7	8	9
Power:	dollars	years	dollars						
W-1 tractor	2600	6	1040	1820	260.00	91.00	351.00	60.67	411.67
W-2 tractor	3000	6	1200	2100	300.00	105.00	405.00	70.00	475.00
Pickup truck	2000	5	400	1200	320.00	60.00	380.00	54.00e/	434.00
Subtotal					880.00	256.00	1,136.00	184.67	1,320.67
Equipment:									
Plow, 2w/2-16"	550	10		275	55.00	13.75	68.75	6.88	75.63
8' chisel f/	525	10		263	52.50	13.15	65.65	6.58	72.23
7 1/2' offset disk	650	10		325	65.00	16.25	81.25	8.12	89.37
6' tandem disk	400	10		200	40.00	10.00	50.00	5.00	55.00
16' spiketooth harrow	120	15		60	8.00	3.00	11.00	1.50	12.50
12' cultipacker	380	10		190	38.00	9.50	47.50	4.75	52.25
4-row lister planter	550	10		275	55.00	13.75	68.75	6.88	75.63
4-row cultivator	1000	10		500	100.00	25.00	125.00	12.50	137.50
2-row fertilizer attachment	100	10		50	10.00	2.50	12.50	1.25	13.75
1-row cotton picker	8700	5	1740	5220	1,392.00	261.00	1,653.00	174.00	1,827.00
6-bale cotton trailer (3)	1350	5	135	742	243.00	37.10	280.10	18.55	298.65
2-row stalk cutter	325	10		163	32.50	8.15	40.65	4.08	44.73
7' power mower	350	10		175	35.00	8.75	43.75	4.38	48.13
8' side delivery rake	520	10		260	52.00	13.00	65.00	6.50	71.50
Subtotal					2,178.00	434.90	2,612.90	260.97	2,873.87
Irrigation water:									
Pumping plant	5400	20	135	2968	263.25	138.40	401.65	133.14	534.79
Well and casing	1750	20		875	87.50	43.75	131.25	42.09	173.34
Pipeline	5043	30		2522	168.11	126.10	294.21	121.31	415.52
Alfalfa valves	1856	30		928	61.87	46.40	108.27	44.64	152.91
Siphons	375	5		188	75.00	9.40	84.40	9.04	93.44
Subtotal					655.73	364.05	1,019.78	350.22	1,370.00
Total fixed costs, all items					3,713.73	1,054.95	4,768.68	795.86	5,564.54

(Continued on next page.)

Table 19 continued.

a/ $\frac{\text{Original cost + Salvage value}}{2}$

b/ $\frac{\text{Original cost - Salvage value}}{\text{Life}}$

c/ 5 percent x average investment.

d/ 3.3333 percent x average investment (power and equipment).
4.81 percent x average investment (irrigation system).

e/ Includes $25 license and $25 insurance.

f/ Standby equipment.

TABLE 20

Variable Expenses: Power, Equipment, and Irrigation Water, 160-acre Farms; 1953 and 1955

Item	1953			1955					
	160-1 and 160-2 Farms			160-1 Farm			160-2 Farm		
	fuel & lube a/	repairs	total	fuel & lube a/	repairs	total	fuel & lube a/	repairs	total
	1	2	3	4	5	6	7	8	9
	dollars								
Power:									
W-1 tractor	114.00	60.00	174.00	103.12	60.00	163.12	96.40	60.00	156.40
W-2 tractor	444.99	100.00	544.99	282.51	90.00	372.51	378.99	100.00	478.99
Pickup truck	250.00	100.00	350.00	250.00	100.00	350.00	250.00	100.00	350.00
Subtotal			1,068.99			885.63			985.39
Equipment:									
Plow, 2w/2-16"		82.50	82.50		82.50	82.50		82.50	82.50
7 1/2' offset disk		97.50	97.50		97.50	97.50		97.50	97.50
6' tandem disk		60.00	60.00		60.00	60.00		60.00	60.00
16' spiketooth harrow		2.40	2.40		2.40	2.40		2.40	2.40
12' cultipacker		38.00	38.00		38.00	38.00		38.00	38.00
4-row lister planter		55.00	55.00		55.00	55.00		55.00	55.00
4-row cultivator		200.00	200.00		200.00	200.00		200.00	200.00
2-row fertilizer attachment		20.00	20.00		20.00	20.00		20.00	20.00
1-row cotton picker		1,455.00	1,455.00		1,455.00	1,455.00		1,455.00	1,455.00
6-bale cotton trailer (3)		40.50	40.50		40.50	40.50		40.50	40.50
2-row stalk cutter		16.25	16.25		16.25	16.25		16.25	16.25
7' power mower		35.00	35.00		35.00	35.00		35.00	35.00
8' side delivery rake		52.00	52.00		52.00	52.00		52.00	52.00
Subtotal			2,154.15			2,154.15			2,154.15

(Continued on next page.)

Table 20 continued.

Item	1953			1955					
	160-1 and 160-2 Farms			160-1 Farm			160-2 Farm		
	lube & power b/	repairs	total	lube & power b/	repairs	total	lube & power b/	repairs	total
	1	2	3	4	5	6	7	8	9
	dollars								
Irrigation water:									
Pumping plant	1,084.64	108.00	1,192.64	1,194.48	108.00	1,302.48	1,099.28	108.00	1,207.28
Pipeline		25.22	25.22		25.22	25.22		25.22	25.22
Alfalfa valves		9.28	9.28		9.28	9.28		9.28	9.28
Subtotal			1,227.14			1,336.98			1,241.78
Total variable expenses, all items			4,450.28			4,376.76			4,381.32

a/ W-1: $ .40 per hour
W-2: $ .60 per hour
Pickup: $ .025 per mile

b/ Power and lube costs obtained as follows (per pump):
Power cost = sum of following charges:
(1) Service charge ($128 for 20 h.p. motor)
(2) First 1,000 kw-hrs @ $ .014 per h.p.
(3) Second 1,000 kw-hrs @ $ .0085 per h.p.
(4) Remaining kw-hrs @ $ .006 per h.p.
Lube cost = 1 percent of power cost.

$$\text{Kw-hrs} = \frac{\text{Rated h.p. x 100 x .746 x hrs pumped}}{\text{Motor efficiency}}$$

an increase in the water applications on allotted cotton acres. The same reasons explain the higher water use on the 160-2 farm, although corn does not require as much water as irrigated pasture. Per acre applications for crops on 160-acre farms were as follows:

Crop	1953	1955
	acre inches	
Cotton	31.2	36.0
Alfalfa	44.4	44.4
Irrigated pasture	--	60.0
Field corn	--	36.0

The fixed costs per acre foot of water on the 160-1 farm decreased from $3.02 in 1953 to $2.52 in 1955, and on the 160-2 farm, from $3.02 to $2.95 (Table 21). These declines reflect increased water use after allotments.

Establishing Alfalfa and Irrigated Pasture Stands

We distributed the cost of establishing an alfalfa stand over four years, as in the 80-acre farm analysis. The total amount charged off in 1953 was $757 on each farm. This cost decreased to $670 on the 160-1 and to $651 on the 160-2 farm in 1955 due to reduced alfalfa acreage.

The production costs for irrigated pasture on the 160-1 farm are treated in the same way as those for alfalfa, but we depreciated the cost of establishing the stand over eight years. The amount charged off annually is added to the fixed costs of maintaining pasture.

Total Variable Expenses Declined Only Two Percent From 1953 to 1955

Power and equipment.--The annual repair costs for power units in 1955 were the same as in 1953, with one exception: The total repair costs for the W-2 tractor on the 160-1 farm declined $10 (Table 20).

There were no changes in annual repair costs for equipment on these farms. Costs per hour increased in 1955 for all items which were used less in that year, while the opposite effect occurred for those items which were used more after allotments (Table 20).

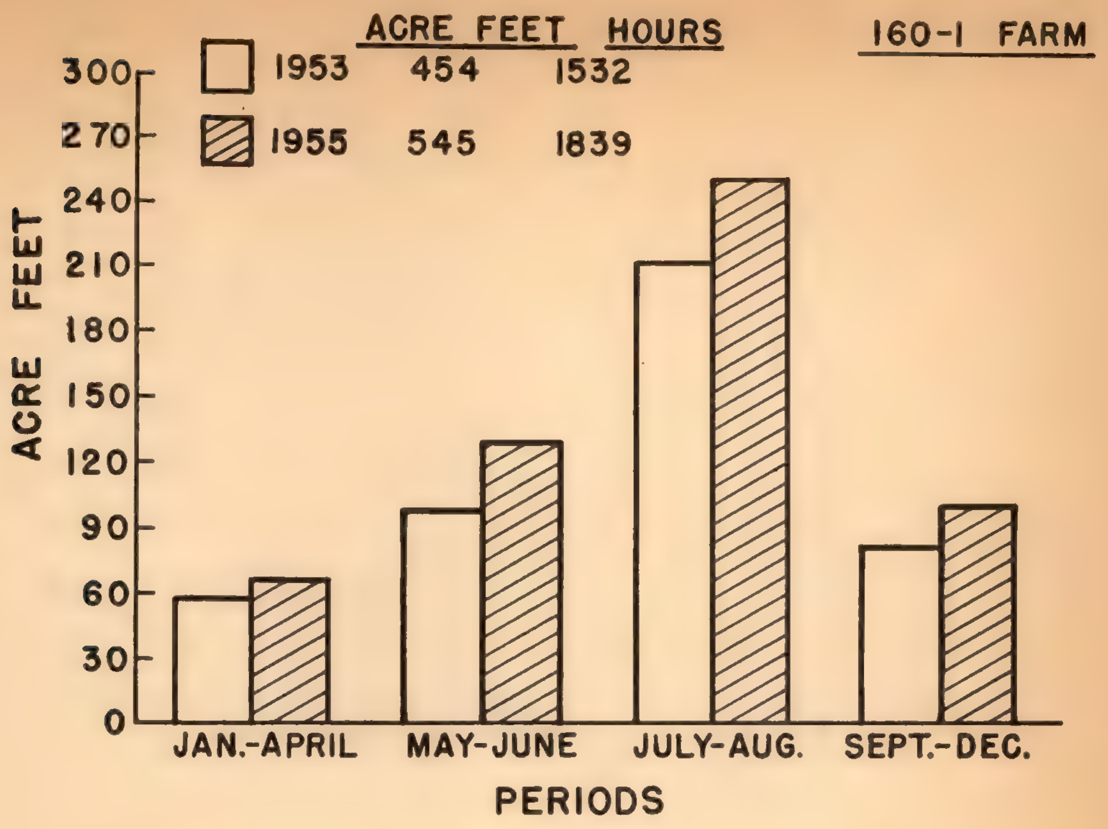
TABLE 21

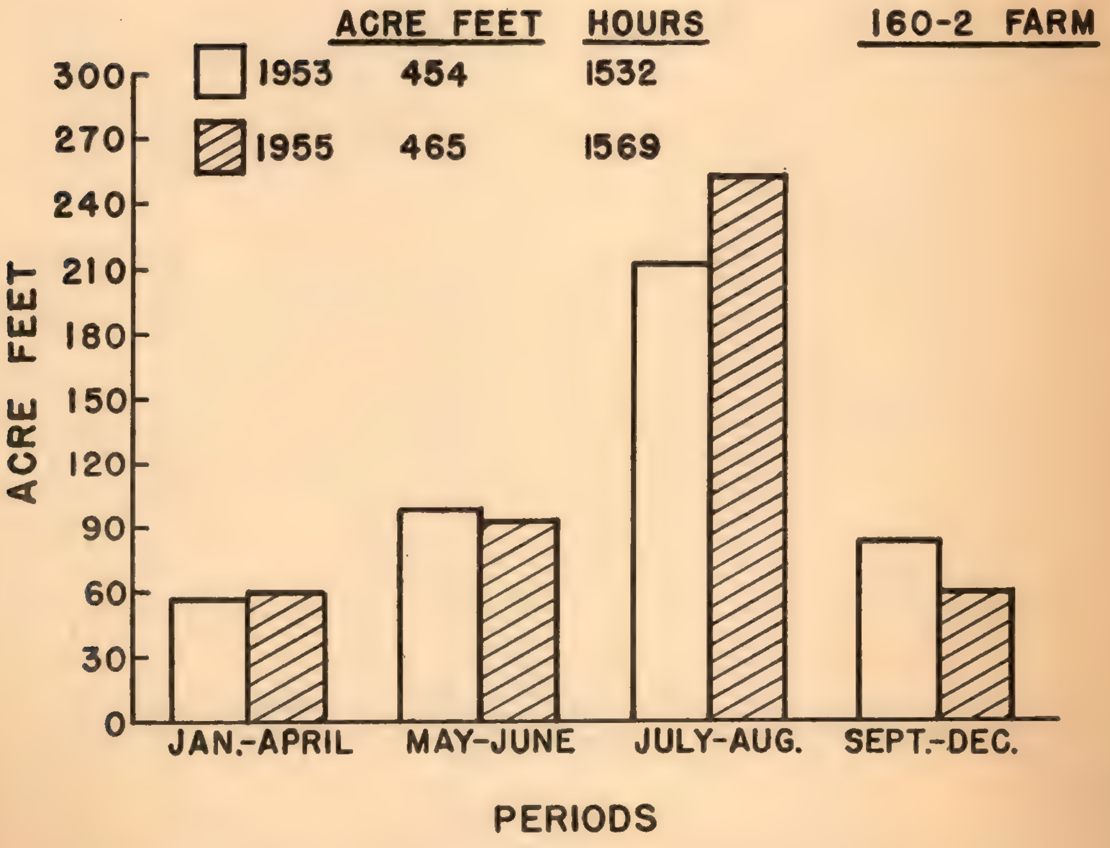
Unit Costs a/: Power, Equipment, and Irrigation Water, 160-acre Farms; 1953 and 1955

160-1 Farm							
Item	Unit	Fixed cost per unit		Variable expenses per unit		Total cost per unit	
		1953	1955	1953	1955	1953	1955
	1	2	3	4	5	6	7
Power:		dollars					
W-1 tractor	hour	1.44	1.60	.61	.63	2.05	2.23
W-2 tractor	hour	.64	1.02	.74	.80	1.38	1.82
Pickup truck	mile	.04	.04	.04	.04	.08	.08
Equipment:							
Plow, 2w/2-16"	hour	1.12	2.04	1.22	2.24	2.34	4.28
7 1/2' offset disk	hour	1.12	1.51	1.22	1.64	2.34	3.15
6' tandem disk	hour	.73	.68	.80	.74	1.53	1.42
Spiketooth harrow (4)	hour	.63	.36	.12	.07	.75	.43
12' cultipacker	hour	3.49	6.38	2.53	4.63	6.02	11.01
4-row lister planter	hour	1.60	2.93	1.16	2.13	2.76	5.06
4-row cultivator	hour	.62	1.14	.91	1.66	1.53	2.80
2-row fertilizer attachment	hour	.28	.53	.42	.76	.70	1.29
1-row cotton picker	hour	8.76	16.03	6.98	12.76	15.74	28.79
6-bale cotton trailer (3)	hour	2.66	4.85	.36	.66	3.02	5.51
2-row stalk cutter	hour	1.20	2.19	.43	.79	1.63	2.98
7' power mower	hour	.45	.41	.32	.30	.77	.71
8' side delivery rake	hour	.71	.82	.51	.60	1.22	1.42
Irrigation water:	acre foot	3.02	2.52	2.70	2.45	5.72	4.97
160-2 Farm							
Power:							
W-1 tractor	hour	1.44	1.71	.61	.65	2.05	2.36
W-2 tractor	hour	.65	.75	.73	.76	1.38	1.51
Pickup truck	mile	.04	.04	.04	.04	.08	.08
Equipment:							
Plow, 2w/2-16"	hour	1.12	1.04	1.22	1.13	2.34	2.17
7 1/2' offset disk	hour	1.12	1.11	1.22	1.21	2.34	2.32
6' tandem disk	hour	.73	.71	.80	.78	1.53	1.49
Spiketooth harrow (4)	hour	.63	.63	.12	.12	.75	.75
12' cultipacker	hour	3.49	6.38	2.53	4.63	6.02	11.01
4-row lister planter	hour	1.60	1.47	1.16	1.07	2.76	2.54
4-row cultivator	hour	.62	.65	.91	.95	1.53	1.60
2-row fertilizer attachment	hour	.28	.26	.42	.39	.70	.65
1-row cotton picker	hour	8.76	16.03	6.98	12.77	15.74	28.80
6-bale cotton trailer (3)	hour	2.66	4.86	.36	.66	3.02	5.52
2-row stalk cutter	hour	1.20	2.19	.43	.79	1.63	2.98
7' power mower	hour	.45	.51	.32	.38	.77	.89
8' side delivery rake	hour	.71	.82	.51	.60	1.22	1.42
Irrigation water:	acre foot	3.02	2.95	2.70	2.67	5.72	5.62

a/ Rounded.

Figure 5. Irrigation Water Use, 1953 and 1955; 160-acre Farms





Total variable expense of operating the cotton picker was $1,455 or 68 percent of total equipment variable costs in both 1953 and 1955. The cost per hour of use of the cotton picker increased from $15.74 in 1953 to $28.79 in 1955 (Table 21).

We assigned the cost of operating the pickup truck, $ .035 per mile, to crops, in accordance with the mileage allocation previously discussed.

Materials.--The cost per acre foot of water totaled $5.72 on both farms in 1953. In 1955, the per acre foot cost decreased to $4.97 on the 160-1 farm and to $5.62 on the 160-2 unit. The required annual repairs on the pumping plant and distribution system did not change between 1953 and 1955; power costs increased, but at a decreasing rate, due to declining charges per kw-hrs.

Per acre fertilizer costs for cotton increased slightly in 1955, due to increased applications on allotted acres. Seed prices, also on a per acre basis, remained the same for all crops.'

Labor.--Operations on the 160-acre farms required a total of 1,382 tractor and truck driving hours in 1953 (operator labor). After allotments, total driving declined to 1,029 hours on the 160-1 farm and to 1,179 on the 160-2 unit. 1/ Both reductions resulted from using diverted cotton acres for alternatives with lower per acre tractor requirements.

Total irrigator labor hours increased between 1953 and 1955 because both farm models used more water in the latter year. The third labor category, general labor, was more important on the 160-acre farms than on the 80-acre farm.

Contract services.--The costs of contract operations accounted for about 30 percent of the total variable expenses in producing cotton. Off-farm services in producing this crop were less important than on the 80-acre farm, primarily

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1/ As on the 80-acre farm, these total hours include the share of driving required to establish alfalfa and irrigated pasture.

because picking was not contracted. Total acre contract costs increased in 1955 due to the higher ginning, storage, and insurance costs associated with yield gains. Cotton yields on both farms rose from 1.25 to 1.5 bales per acre between the two years.

Contract costs were roughly 43 percent of alfalfa costs and 22 percent of those for producing field corn. Alfalfa hay baling and corn picking were the most important items in contract costs for these two crops. Baling and roadsiding costs, per acre, were higher in 1955, due to increased alfalfa yield, but other variable expenses also rose.

Outlays For Other Crops Increased Less Than Those For Cotton; Total Farm Costs Dropped From 1953-1955

Total fixed costs for each farm model, excluding the costs of establishing alfalfa and irrigated pasture in 1953 and 1955, were:

Item	Total fixed cost
Power	$1,320.67
Equipment	2,873.87
Irrigation system	1,370.00
Real estate taxes	1,040.00
Office expenses	225.00
Improvements	228.38
Total 1/	$7,057.92
Per acre	44.11

Total per acre variable and fixed costs for cotton and alfalfa increased between 1953 and 1955 (Table 22). The increases for alfalfa were not as large as the rise in cotton costs. The total fixed costs for each cotton acre increased from $65 on both farms in 1953 to $99 on the 160-1, and to $94 on the 160-2 farm in 1955. Equipment cost increases, particularly those for the cotton picker, were important in causing these increases. Both fixed and variable per acre costs for cotton increased less on the 160-2 farm, although production

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1/ This sum includes $1,126 as interest on investment in the operator's fixed capital, figured at the rate of 5 percent of the average investment.

TABLE 22

Input Costs by Crops and Total Farm, 160-acre Farms; 1955 and 1953

160-1 Farm: 1955							
Item	Cotton (41 acres)		Alfalfa (60 acres)		Irrigated pasture (40 acres)		Total farm
	per acre	total	per acre	total	per acre	total	
	1	2	3	4	5	6	7
	dollars						
Fixed:	98.64	4,043.95	40.37	2,422.00	34.08	1,363.09	7,829.04
Variable:							
Power	12.05	494.05	3.82	229.20	3.30	132.00	855.25
Equipment	48.51	1,988.91	1.33	79.80	1.25	50.00	2,118.71
Materials	20.84	854.44	9.10	546.00	21.30	852.00	2,252.44
Labor	32.82	1,345.59	22.46	1,347.68	27.58	1,103.28	3,796.55
Contract	49.58	2,032.94	28.87	1,732.20			3,765.14
Total variable	163.80	6,715.93	65.58	3,934.88	53.43	2,137.28	12,788.09
Total cost	262.44	10,759.88	105.95	6,356.88	87.51	3,500.37	20,617.13

160-2 Farm: 1955							
Item	Cotton (41 acres)		Alfalfa (60 acres)		Field corn (40 acres)		Total farm
	per acre	total	per acre	total	per acre	total	
	1	2	3	4	5	6	7
	dollars						
Fixed:	94.10	3,857.81	42.23	2,533.60	31.65	1,265.75	7,657.16
Variable:							
Power	11.65	477.65	3.87	232.20	6.33	253.20	963.05
Equipment	44.51	1,824.91	1.45	87.00	5.84	233.60	2,145.51
Materials	21.49	881.09	9.90	594.00	25.83	1,033.20	2,508.29
Labor	32.82	1,345.59	22.46	1,347.68	22.46	898.45	3,591.72
Contract	49.48	2,028.71	28.87	1,732.20	19.83	793.38	4,554.29
Total variable	159.95	6,557.95	66.55	3,993.08	80.29	3,211.83	13,762.86
Total cost	254.05	10,415.76	108.78	6,526.68	111.94	4,477.58	21,420.02

160-1 and 160-2 Farms: 1953							
Item	Cotton (75 acres)		Alfalfa (70 acres)				Total farm
	per acre	total	per acre	total	per acre	total	
	1	2	3	4	5	6	7
	dollars						
Fixed:	65.74	4,930.81	40.40	2,828.14			7,758.95
Variable:							
Power	10.74	805.50	3.42	239.40			1,044.90
Equipment	27.44	2,058.00	1.24	86.80			2,144.80
Materials	19.42	1,456.50	9.99	699.30			2,155.80
Labor	30.41	2,280.52	22.22	1,555.26			3,835.78
Contracts	44.91	3,368.06	27.57	1,929.90			5,297.96
Total variable	132.92	9,968.58	64.44	4,510.66			14,479.24
Total cost	198.66	14,899.39	104.84	7,338.80			22,238.19

practices and physical inputs on the two farms were identical. This was largely because corn was more effective than irrigated pasture in preventing a sharp drop in using resources previously devoted to cotton. In contrast, the 160-1 farm, by growing irrigated pasture, experienced smaller cost increases in producing alfalfa than the 160-2 farm.

Price and Yield Gains for Both Cotton Lint and Alfalfa Helped Maintain Earnings on 160-acre Farms

Total gross receipts were $24,017 on both 160-acre farms in 1953. Following the 1955 cropping adjustments, total gross receipts declined to $22,571 on the 160-1 and to $23,851 on the 160-2 farms, in spite of price and yield increases for cotton and alfalfa. If such increases had not occurred, total gross receipts for both organizations would have dropped $4,477 below those of 1953.

Conditions	Gross receipts in 1955 a/ 160-1	160-2	Reduction from observed gross receipts
	1	2	3
	dollars		
Observed change in YIELD and PRICE of:			
Cotton and alfalfa	22,571	23,851	
No change in YIELD and PRICE of:			
Cotton and alfalfa	18,094	19,374	4,477
Cotton alone	19,870	21,150	2,701
Alfalfa alone	20,795	22,075	1,776
No change in PRICE of:			
Cotton and alfalfa	20,176	21,456	2,395
Cotton alone	21,628	22,908	943
Alfalfa alone	21,119	22,399	1,452
No change in YIELD of:			
Cotton and alfalfa	20,266	21,546	2,305
Cotton alone	20,656	21,936	1,915
Alfalfa alone	22,181	23,461	390

a/ Rounded.

Earnings on the 160-1 farm.--Total costs for the 160-1 farm, excluding interest on the land investment, declined $1,621 between 1953 and 1955. Total gross receipts for this farm decreased by $1,446 over the same period, and, therefore, receipts-minus-costs were $175 higher in 1955. The following per acre summary illustrates the costs and returns by crops:

160-1 Farm					
Per acre	Cotton		Alfalfa		Irrigated pasture
	1953	1955	1953	1955	1955
	1	2	3	4	5
	dollars				
Gross receipts	214.40	280.27	113.40	143.00	62.50
Variable expenses[a]	132.92	163.80	64.44	65.58	53.43
Balance	81.48	116.47	48.96	77.42	9.07
Fixed costs	65.74	98.64	40.40	40.37	34.08
Balance	15.74	17.83	8.56	37.05	-25.01

[a] If we deduct from these variable expenses, the allocated costs of "general" pickup truck use and accompanying labor, Social Security, and interest charges on operating capital, the remaining per acre variable expenses consist only of direct production costs. They are as follows:

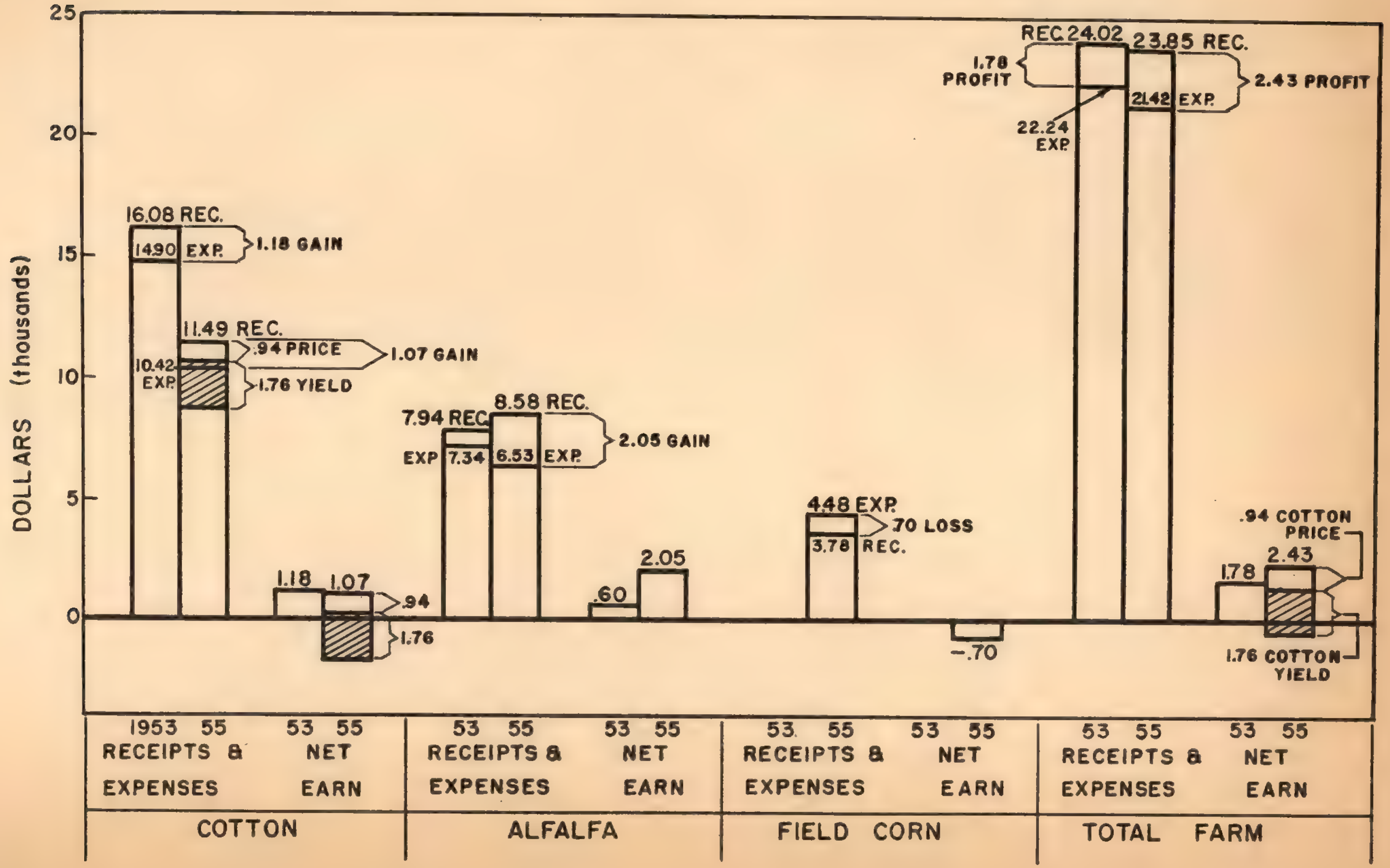
Crop	1953	1955
Cotton	127.41	157.15
Alfalfa	61.64	62.21
Irrigated pasture	--	50.06

The 160-1 farm showed a net return above costs, not including interest on land investments for cotton and alfalfa in both years. This balance was higher in 1955 for both crops, but more noticeable for alfalfa. The percentage increases in per acre gross receipts from cotton and alfalfa were nearly alike, but cotton costs increased, percentagewise, far more than those for alfalfa. Gross receipts from irrigated pasture covered variable costs but the remaining balance was insufficient to cover the fixed costs assigned to this crop (Figure 6).

Total net receipts, the difference between total gross receipts and all costs, were $ -621 in 1953 and $ -445 in 1955 (Table 23).

Net farm income declined from $4,287 in 1953 to $4,109 in 1955, even though net receipts were somewhat higher in the latter year. Lower operator labor

Figure 6. Changes in Gross Receipts, Expenses, and Net Returns on 160-acre (160-2) Farm in Central San Joaquin Valley, 1953-1955 (in thousands dollars).



Source: Calculated from survey data.

TABLE 23

Gross Receipts, Costs, and Earnings by Crops and Total Farm, 160-acre Farms; 1955 and 1953

160-1 Farm: 1955

Item	Cotton lint	Cotton seed	Alfalfa	Irrigated pasture	Total farm
	1	2	3	4	5
Acres	41		60	40	141
Yield	1.5 bales[a]	.638 tons[b]	5.5 tons	5,000 TDN[c]	
Production	61.5 bales	26.14 tons	330 tons	200,000 TDN	
Price	$167.30/bale	$46.00/ton	$26.00/ton	$5/400 TDN	
	$10,288.95	$1,202.44			
Gross receipts	$11,491.39		$8,580.00	$ 2,500.00	$22,571.39
Costs (less land)	10,759.88		6,356.88	3,500.37	20,617.13
Receipts minus costs	731.51		2,223.12	-1,000.37	1,954.26
Land interest ($300/acre [d] at 5%)	757.50		971.25	671.25	2,400.00
Net	$ -25.99		$1,251.87	$-1,671.62	$ -445.74
Add:					
Interest on fixed capital (incl. land)					3,525.83
Operator's labor [e]					1,028.97
Net farm income					$ 4,109.06
Less:					
Operator's labor (imputed)					2,500.00
Return to capital and management					$ 1,609.06
Rate earned on investment					2.28%

160-2 Farm: 1955

Item	Cotton lint	Cotton seed	Alfalfa	Field corn	Total farm
	1	2	3	4	5
Acres	41		60	40	141
Yield	1.5 bales[a]	.638 tons[b]	5.5 tons	35 cwt.	
Production	61.5 bales	26.14 tons	330 tons	1,400 cwt.	
Price	$167.30/bale	$46.00/ton	$26.00/ton	$2.70/cwt.	
	$10,288.95	$1,202.44			
Gross receipts	$11,491.39		$8,580.00	$ 3,780.00	$23,851.39
Costs (less land)	10,415.76		6,526.68	4,477.58	21,420.02
Receipts minus costs	1,075.63		2,053.32	-697.58	2,431.37
Land interest ($300/acre [d] at 5%)	757.50		971.25	671.25	2,400.00
Net	$ 318.13		$1,082.07	$-1,368.83	$ 31.37
Add:					
Interest on fixed capital (incl. land)					3,525.83
Operator's labor [e]					1,178.72
Net farm income					$ 4,735.92
Less:					
Operator's labor (imputed)					2,500.00
Return to capital and management					$ 2,235.92
Rate earned on investment					3.17%

(Continued on next page.)

Table 23 continued.

160-1 and 160-2 Farms: 1953

Item	Cotton lint	Cotton seed	Alfalfa		Total farm
	1	2	3	4	5
Acres	75		70		145
Yield	1.25 bales[a]	.531 tons[b]	5.25 tons		
Production	93.75 bales	39.84 tons	367.5 tons		
Price	$148.99/bale	$53.00/ton	$21.60/ton		
	$13,967.81	$2,111.15			
Gross receipts	$16,079.33		$7,938.00		$24,017.33
Costs (less land)	14,899.39		7,338.80		22,238.19
Receipts minus costs	1,179.94		599.20		1,779.14
Land interest ($300/acre [d] at 5%)	1,237.50		1,162.50		2,400.00
Net	$ -57.56		$ -563.30		$ -620.86
Add:					
Interest on fixed capital (incl. land)					3,525.83
Operator's labor [e]					1,381.88
Net farm income					$ 4,286.85
Less:					
Operator's labor (imputed)					2,500.00
Return to capital and management					$ 1,786.85
Rate earned on investment					2.53%

[a] 500 lb. bales (lint: 478 lbs.; bagging and ties: 22 lbs.).

[b] 850 pounds or 0.425 ton of seed per bale of lint.

[c] Total digestible nutrient.

[d] Bare land was valued at an arbitrary figure of $300 per acre. This value was estimated from available rental and assessment values and is the figure used for Grades I and II based on all farm models. We found it impossible to obtain a realistic current market value of land in Central subarea since property does not change hands frequently enough to suggest an average sale value. We do not present the $300 estimate as a precise market value. Readers should not interpret it as such.

[e] Includes total operator's labor used in producing crops and in establishing:
1/8 of total irrigated pasture acreage for 160-1 farm, and
1/4 of total alfalfa acreage for 160-1 and 160-2 farms.

utilization after allotments explains this shift. We obtained net farm income by adding interest on total fixed capital and the cost of actual operator labor to net receipts. Interest, $3,526, was the same in both years, while the total operator labor cost declined $353 in 1955. Net cash income also dropped slightly, from $8,113 in 1953 to $7,933 in 1955.

Return to capital and management (profit), after deducting the cost of operator labor from net farm income, was $2,461 in 1953 and $2,281 in 1955. These earnings represented rates earned on investment of 2.5 percent in 1953 and 2.3 percent in 1955. If no yield increases had occurred for cotton and alfalfa, the profit on this farm would have been $ -696 instead of $1,787, and the rate of earnings would have dropped to -1.0 percent (Table 23 and text table on page 71). Failure of both price and yield increases to occur would have meant a profit of $-2,868, or -4.1 percent, on the investment.

Earnings on the 160-2 farm. Total costs other than interest on land investments for the 160-2 farm declined by $818 between 1953 and 1955. Total gross receipts decreased by $166 over the same period, and, consequently, receipts-minus-costs were $652 higher in 1955 than in 1953. Gross receipts, costs, and net balances per acre, by crops, were as follows:

160-2 Farm					
	Cotton		Alfalfa		Field corn
Per acre	1953	1955	1953	1955	1955
	1	2	3	4	5
	dollars				
Gross receipts	214.40	280.27	113.40	143.00	94.50
Variable expenses[a]	132.92	159.95	64.44	66.55	80.29
Balance	81.48	120.32	48.96	76.45	14.21
Fixed costs	65.74	94.10	40.40	42.23	31.65
Balance	15.74	26.22	8.56	34.22	-17.44

[a] If we deduct from these variable expenses, the allocated costs of "general" pickup truck use and accompanying labor,
S Social Security, and interest charges on operating capital,
the remaining per acre variable expenses would consist only of direct production costs. These are as follows:

Crop	1953	1955
Cotton	127.41	150.52
Alfalfa	61.64	63.18
Corn	--	76.82

The 1955 net returns from cotton were higher for the 160-2 than for the 160-1 farm. Gross cotton receipts were identical, but cotton costs increased less on the 160-2 unit. The opposite was true for alfalfa; 1955 net returns were slightly below corresponding returns on the 160-1 farm. This is because alfalfa costs increased more on the 160-2 unit. These costs differences reflect the dissimilar effects of corn and irrigated pasture on total farm resource use, as pointed out earlier. Field corn receipts covered the variable expenses for this crop plus about one-half of the assigned fixed costs.

Net receipts were $-621 in 1953 and $31 in 1955, while net farm income rose from $4,287 to $4,736 between these years. The 160-2 farm made greater use of operator labor in 1955 than the 160-1 farm, due to greater capacity of corn than pasture for labor inputs. Total operator labor use on the 160-2 farm was lower in 1955, however, than on the same farm prior to allotments. Net cash income increased from $8,113 to $8,561 between the two years.

Profit for the 160-2 organization, unlike profit on the 160-1 farm, actually increased between the two years, from $1,787 in 1953 to $2,236 in 1955. Consequently, the rate earned on investment rose from 2.5 percent to 3.2 percent over the same period. If yields had not increased for cotton and alfalfa, profit would have been $-69 and the rate of earnings, -0.01 percent in 1955. The results, if neither prices nor yields had risen, would have shown profits of $-2,235, and a return of -3.2 percent on the investment.

THE 320-ACRE FARM HAD THE HIGHEST DOLLAR AND PERCENTAGE PROFITS

Capital Investments Were the Same For Both Years

Our 320-acre farm analysis model had the following capital investments in 1953 and 1955:

Item	Investment (1955 prices)	Percent of total investment
Power	$12,540.00	28.7
Equipment	11,175.00	25.6
Irrigation system	15,219.00	34.8
Improvements	4,760.00	10.9
Total	$43,694.00	100.0
Per acre	136.54	

Power and transportation equipment on the 320-acre unit included four tractors, a pickup and a truck. These accounted for more than twice the power investments on the 160-acre farms. The tractors included one diesel 5-plow capacity tracklayer, two 30-horsepower (W-2) and 1 25-horsepower (W-1) rowcrop tractors. Additional equipment on the 320-acre farm model, as compared with the 160-acre farms, included a two-wire hay baler, a ditcher, and a scraper (Table 24). The one-row cotton picker, as on 160-acre farms, was the most costly investment. It accounted for 47 percent of total equipment investment, as against 60 percent on the 160-acre farms. The operator rented a broadcaster for alfalfa, irrigated pasture, and barley, and a border disk for barley. He also used contract services for several operations on cotton, alfalfa, irrigated pasture, barley, and ensilage corn.

Total investment in irrigation pumping and distribution facilities was roughly twice that of the 160-acre farms. The operator obtained irrigation water from four wells, each with a pumping capacity of 800 g.p.m. (Figure 7).

Cotton production inputs and practices were the same in both 1953 and 1955 except for water and fertilizer inputs. Water application increased from 31.2 to 36.0 acres inches per acre, and fertilizer from 400 to 425 pounds of ammonium sulfate. There were no changes in practices for alfalfa and irrigated pasture.

TABLE 24

Physical Resources and Investments for Typical 320-acre Farm, 1955 Prices

Item	Size or capacity	Amount	New cost		Average investment a/	
			per unit	total	per unit	total
	1	2	3	4	5	6
			dollars			
Land:						
Total	320 acres					
Total cultivated	290 acres					
Improvements:						
Tenant house		1		4,000.00		2,000.00
Tractor shed		1		1,250.00		625.00
Storage shed		2	2,000.00	4,000.00	1,000.00	2,000.00
Fuel storage - gas	550 gallons	1		135.00		67.50
Fuel storage - diesel	550 gallons	1		135.00		67.50
Subtotal				9,520.00		4,760.00
Irrigation system:						
Pumping plant	20 h.p.; 800 g.p.m.	4	2,700.00	10,800.00	1,383.75	5,535.00
Well, casing	14" diameter; 90' lift	4x175'	5.00	3,500.00	2.50	1,750.00
Pipe	16"	7,200'	1.00	7,200.00	.50	3,600.00
Pipe	12"	5,000'	.80	4,000.00	.40	2,000.00
Stands	8' x 36"	4	72.00	288.00	36.00	144.00
Vents	8' x 8"	12	5.60	67.20	2.80	33.60
Alfalfa valves	12"	200	18.56	3,712.00	9.28	1,856.00
Siphons	1" - 3"	400	1.50	600.00	.75	300.00
Subtotal				30,167.20		15,218.60
Power:						
Tracklayer	T-5D	1		7,000.00		3,850.00
Wheel tractor	W-1	1		2,600.00		1,820.00
Wheel tractor	W-2	2	3,000.00	6,000.00	2,100.00	4,200.00
Pickup	1/2 ton	1		2,000.00		1,200.00
Truck	1 1/2 ton	1		2,800.00		1,470.00
Subtotal				20,400.00		12,540.00
Equipment:						
Ditcher	5'	1		140.00		70.00
Scraper	5'	1		150.00		75.00
Plow, 2 way	2-16"	1		550.00		275.00
Chisel	8'	1		525.00		262.50
Disk, offset	7 1/2'	1		650.00		325.00
Disk, tandem	7'	1		500.00		250.00
Spiketooth harrow	4' section	3	30.00	90.00	15.00	45.00
Cultipacker	10'	1		325.00		162.50
Lister planter	4-row	1		550.00		275.00

(Continued on next page.)

Table 24 continued.

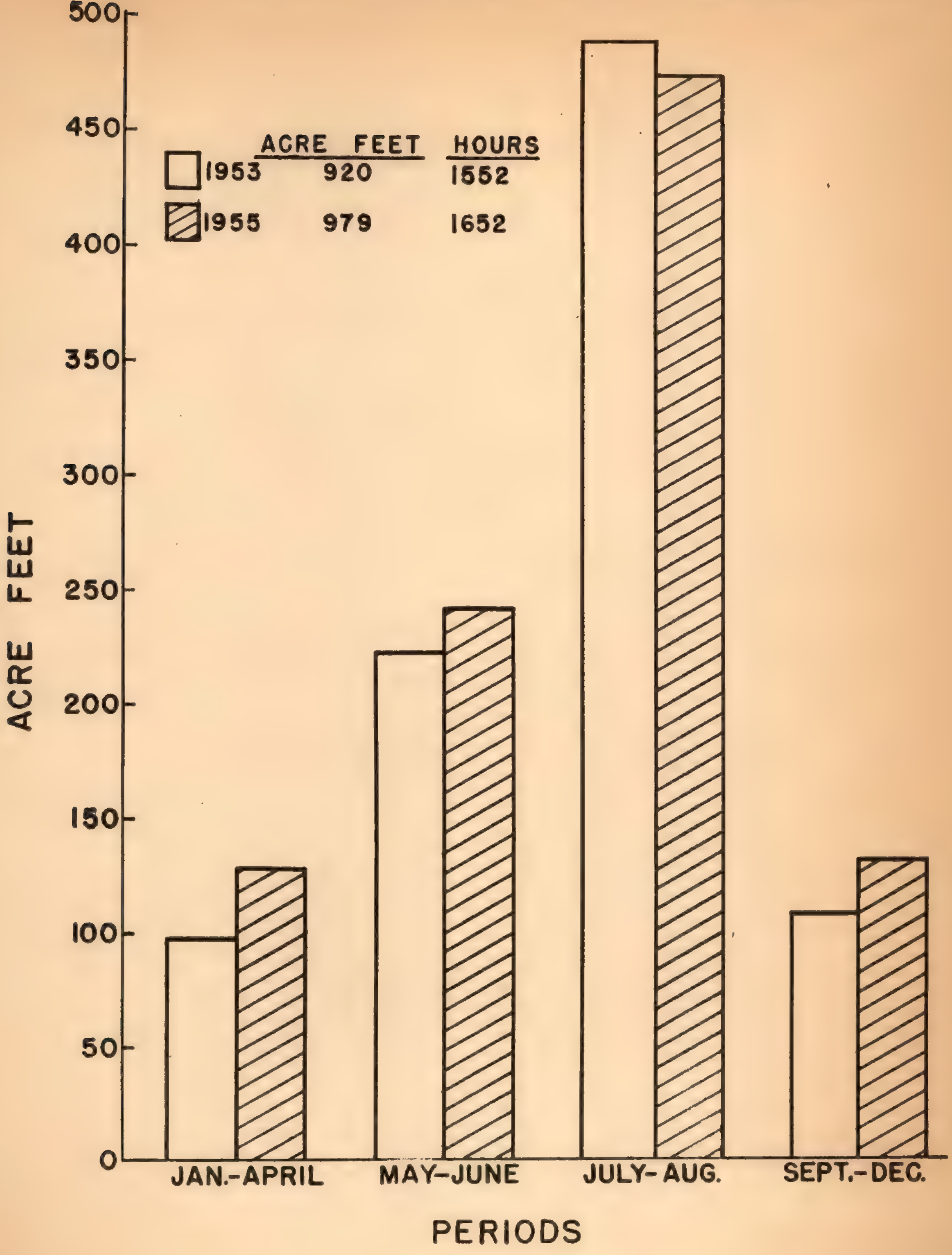
Item	Size or capacity	Amount	New cost per unit	New cost total	Average investment a/ per unit	Average investment a/ total
	1	2	3	4	5	6
			dollars			
Equipment (continued):						
Cultivator	4-row	2	1,000.00	2,000.00	500.00	1,000.00
Fertilizer attachment	4-row	1		150.00		75.00
Cotton picker	1-row	1		8,700.00		5,220.00
Cotton trailer	5-bale	4	400.00	1,600.00	220.00	880.00
Stalk cutter	2-row	1		325.00		162.50
Power mower	7'	1		350.00		175.00
Side delivery rake	8'	1		520.00		260.00
Hay baler	2-wire	1		3,325.00		1,662.50
Subtotal				20,450.00		11,175.00
Total				80,537.20		43,693.60

a/ $\frac{\text{New cost + Salvage value}}{2}$

No salvage value, except as follows:

T-5D tractor:	$ 700.00	
W-1 tractor:	1,040.00	
W-2 tractor:	1,200.00	each
Pickup:	400.00	
Truck:	140.00	
Cotton picker:	1,740.00	
5-bale trailers:	40.00	each
Hay baler:	665.00	
Pumping plant:	280.00	each

Figure 7. Irrigation Water Use, 1953 and 1955; 320-acre Farm



Operators on the 320-acre farm model double-cropped part of their land. Thus, in 1955, the operator had 60 acres of ensilage corn, a summer crop; 40 of these acres had produced barley this same season (Table 8, page 27). Fallow land also decreased by 7 acres, while crops increased by a like number on the 320-acre farm between 1953 and 1955.

Fixed Costs Remained the Same Because Investments Did Not Change

Real estate taxes, office costs, and improvements.--The 60 acres of corn produced in 1955 accounted for 21 percent of the total producing acreage. We, therefore, allocated to this acreage, 21 percent of the total real estate tax, office and improvement costs. Since 40 of the corn acres also produced barley in the same year, we charged corn with 14 percent and barley with 7 percent of the total cost.

The total real estate tax, at $6.50 per acre, amounted to $2,080 in both years, while office costs for this farm were $300 annually. Annual improvements costs totaled $758. [1]

Power and equipment.--Land use adjustments after allotments on the 320-acre farm affected annual use of the various equipment items differently. The operator used many pieces of equipment more after allotments, e.g., the track-laying tractor, plow, disks, harrow, planter, fertilizer attachment, and power mower. Other items, such as those adapted only to cotton, received less use under post-allotment conditions. Double-cropping stimulated increased use for some rowcrop equipment. The total acreage of hay and pasture crops also increased

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[1] Fixed costs of improvements were as follows:

(1) Depreciation, $335.33; new cost ÷ life, which is 30 years for the sheds and tenant house and 10 years for fuel storage facilities.

(2) Repairs, $185.00; 2 percent x average investment, for sheds and tenant house only.

(3) Interest, $238.00; 5 percent x average investment.

between 1953 and 1955, and this fact, too, meant more hours for the equipment concerned. The cotton picker, trailers, and stalk cutter had less use than in 1953 because cotton acreage decreased from 130 to 72 acres (Table 25).

Our estimate places use of the pickup truck for this farm at 12,000 miles per year. We distributed fixed costs as before, giving cotton acres a weighting of "two" and other crop acres a weighting of "one." Cost for annual use of the 1 1/2 ton truck, 5,000 miles, is assigned to all crop acres proportionately.

Irrigation water.--The 320-acre farm used 920 acre feet of irrigation water in 1953 and 979 acre feet in 1955 (Figure 7). Per acre applications were as follows:

Crop	1953	1955
	acre	inches
Cotton	31.2	36.0
Alfalfa	44.4	44.4
Irrigated pasture	60.0	60.0
Corn (ensilage)	--	24.0
Barley	--	10.8

The fixed cost per acre foot of water, which reflects the change in total pumping, decreased from $3.07 in 1953 to $2.88 in 1955 (Tables 26 and 28). The fixed cost for irrigation water per each acre of cotton, nevertheless, increased between these years. This is because the higher per acre application of water offset the reduced cost per acre foot.

Establishing alfalfa and irrigated pasture stands.--The total per acre costs of establishing alfalfa and irrigated pasture decreased slightly between 1953 and 1955 due to lower costs of power, equipment, and irrigation water.

Other Crops Off-set Drop in Cotton Variable Expenses; Total Shows Only Slight Decline

Power and equipment.--Evidence indicates that power and repairs remain reasonably constant over a considerable range of use. We, therefore, made no change in repairs expenses for the range of 350-500 hours of annual use, but

TABLE 25

Annual Power and Equipment Hours, 320-acre Farm; 1953 and 1955

Item	Cotton			Alfalfa			Corn(silage)		Barley		Irrigated pasture			All crop total	
		total			total			total		total		total			
	per acre	1953 (130 ac)	1955 (72 ac)	per acre	1953 (110 ac)	1955 (110 ac)	per acre	1955 (60 ac)	per acre	1955 (40 ac)	per acre	1953 (35 ac)	1955 (40 ac)	1953	1955
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Power:	hours														
T-5D tractor	2.15	279.50	154.80	.63	69.30	69.30	1.85	111.00	.76	30.40	.32	11.20	12.80	360.00	378.30
W-1 tractor	1.31	170.30	94.32	3.06	336.60	336.60	.54	32.40	.44	17.60	.33	11.55	13.20	518.45	494.12
W-2 tractor	5.45	708.50	392.40	2.01	221.10	221.10	1.64	98.40	.22	8.80	1.47	51.45	58.80	981.05	779.50
Pickup (1/2 ton)														(12,000 miles)	
Truck(1 1/2 ton)														(5,000 miles)	
Equipment:															
5' ditcher	.25	32.50	18.00				.20	12.00						32.50	30.00
5' scraper	.25	32.50	18.00				.20	12.00						32.50	30.00
Plow, 2w/2-16"	.75	97.50	54.00				.75	45.00						97.50	99.00
8' chisel				.28	30.80	30.80					.14	4.90	5.60	35.70	36.40
7½' offset disk	.90	117.00	64.80	.35	38.50	38.50	.70	42.00	.35	14.00	.18	6.30	7.20	161.80	166.50
7' tandem disk									.41	16.40	.82	28.70	32.80	28.70	49.20
8' spiketooth harrow				.09	9.90	9.90			.41	16.40	.86	30.10	34.40	a/	a/
12' spiketooth harrow	.22	28.60	15.84	.06	6.60	6.60	.22	13.20	.22	8.80	.03	1.05	1.20	62.92	86.11
10' cultipacker	.27	35.10	19.44											35.10	19.44
4-row lister planter	.63	81.90	45.36				.63	37.80						81.90	83.16
4-row cultivator cultivator	2.36	306.80	169.92				1.33	79.80						306.80	249.72
4-row fertilizer attachment	.45	58.50	32.40				.50	30.00						58.50	62.40
1-row cotton picker	2.78	361.40	200.16											361.40	200.16

(Continued on next page.)

Table 25 continued.

Item	Cotton			Alfalfa			Corn(silage)		Barley		Irrigated pasture			All crop total	
		total			total			total		total		total			
	per acre	1953 (130 ac)	1955 (72 ac)	per acre	1953 (110 ac)	1955 (110 ac)	per acre	1955 (60 ac)	per acre	1955 (40 ac)	per acre	1953 (35 ac)	1955 (40 ac)	1953	1955
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Equipment (cont):	hours														
5-bale cotton trailer	1.50	195.00	108.00											195.00	108.00
2-row stalk cutter	.50	65.00	36.00											65.00	36.00
7' power mower				1.55	170.50	170.50					.62	21.70	24.80	192.20	195.30
8' side delivery rake				1.45	159.50	159.50								159.50	159.50
2-wire hay baler				1.95	214.50	214.50								214.50	214.50

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a/ Total annual hours for 12' spiketooth harrow is 2/3 of 8' spiketooth harrow hours plus 12' spiketooth harrow hours.

TABLE 26

Fixed Costs: Power, Equipment, and Irrigation Water, 320-acre Farm; 1953 and 1955

Item	Original cost	Life	Salvage value	Average invest-ment a/	Annual noncash costs depr. b/	Annual noncash costs int. c/	Annual noncash costs total	Annual cash costs taxes and insur. d/	Total fixed costs
	1	2	3	4	5	6	7	8	9
	dollars	years	dollars						
Power:									
T-5D tractor	7000	10	700	3850	630.00	192.50	822.50	128.33	950.83
W-1 tractor	2600	6	1040	1820	260.00	91.00	351.00	60.67	411.67
W-2 tractor (2)	6000	6	2400	4200	600.00	210.00	810.00	140.00	950.00
Pickup (1/2 ton)	2000	5	400	1200	320.00	60.00	380.00	54.00 e/	434.00
Truck (1 1/2 ton)	2800	10	140	1470	266.00	73.50	339.50	79.90 f/	419.40
Subtotal					2,076.00	627.00	2,703.00	462.90	3,165.90
Equipment:									
5' ditcher	140	10		70	14.00	3.50	17.50	1.75	19.25
5' scraper	150	10		75	15.00	3.75	18.75	1.88	20.63
Plow, 2 way/2-16"	550	10		275	55.00	13.75	68.75	6.88	75.63
8' chisel	525	10		263	52.50	13.15	65.65	6.58	72.23
7 1/2' offset disk	650	10		325	65.00	16.25	81.25	8.12	89.37
7' tandem disk	500	10		250	50.00	12.50	62.50	6.25	68.75
Spiketooth harrow (3)	90	15		45	6.00	2.25	8.25	1.12	9.37
10' cultipacker	325	10		163	32.50	8.15	40.65	4.08	44.73
4-row lister planter	550	10		275	55.00	13.75	68.75	6.88	75.63
4-row cultivator (2)	2000	10		1000	200.00	50.00	250.00	25.00	275.00
4-row fertilizer attachment	150	10		75	15.00	3.75	18.75	1.88	20.63
1-row cotton picker	8700	5	1740	5220	1,392.00	261.00	1,653.00	174.00	1,827.00
5-bale cotton trailer (4)	1600	5	160	880	288.00	44.00	332.00	22.00	354.00
2-row stalk cutter	325	10		163	32.50	8.15	40.65	4.08	44.73
7' power mower	350	10		175	35.00	8.75	43.75	4.38	48.13
8' side delivery rake	520	10		260	52.00	13.00	65.00	6.50	71.50
2-wire hay baler	3325	6	665	1995	443.33	99.75	543.08	66.50	609.58
Subtotal					2,802.83	575.45	3,378.28	347.88	3,726.16
Irrigation water:									
Pumping plant	10800	20	280	5540	526.00	277.00	803.00	266.47	1,069.47
Well and casing	3500	20		1750	175.00	87.50	262.50	84.18	346.68
Pipeline	11555	30		5778	385.17	288.90	674.07	277.92	951.99
Alfalfa valves	3712	30		1856	123.73	92.80	216.53	89.27	305.80
Siphons	600	5		300	120.00	15.00	135.00	14.43	149.43
Subtotal					1,329.90	761.20	2,091.10	732.27	2,823.37
Total fixed costs, all items					6,208.73	1,963.65	8,172.38	1,543.05	9,715.43

(Continued on next page.)

Table 26 continued.

a/ $\frac{\text{Original cost + Salvage value}}{2}$

b/ $\frac{\text{Original cost - Salvage value}}{\text{Life}}$

c/ 5 percent x average investment.

d/ 3.3333 percent x average investment (power and self-powered machinery).

2.5 percent x average investment (equipment).

4.81 percent x average investment (irrigation system).

e/ Includes $25 license and $25 insurance.

f/ Includes $50 license and $25 insurance.

increased them between that use level and the 500-1,000 hours range. Except for the W-1 tractor, repair costs were the same for all tractors in 1953 and 1955. The cost for the W-1 tractor decreased from $85 in 1953 to $75 in 1955 (Table 27).

Variable costs per hour had a tendency to decrease in 1955 for all equipment items used more after allotments, due to the above-outlined method of handling repair costs. Cotton picker expense was the main variable expense item to increase; it jumped from $4.03 per hour in 1953 to $7.27 per hour in 1955. This increase reflects reduced use.

Materials.--A corresponding increase in power, lubrication, and repair costs did not accompany the increased amount of water used in 1955. The variable expense per acre foot of water decreased from $2.90 in 1953 to $2.82 in 1955 (Tables 27 and 28).

The per acre cost of fertilizer for cotton increased slightly in 1955 due to the higher application of ammonium sulfate per acre after allotments.

Labor costs.--The 320-acre cropping system required 2,504 hours of tractor and truck driving in 1953. In 1955, total driving requirements declined to 2,241 hours. This reduction in operator labor use occurred in spite of double-cropping and a decrease in fallow acreage.

Truck driving time was assigned to crops in accordance with truck mileage allocation, a procedure explained for the pickup truck under 80-acre farm costs. We also followed this same procedure for the 320-acre farm in allocating the costs associated with the 1 1/2 ton truck.

Irrigator labor requirements increased in 1955, only for cotton. General labor hours were the same as those described for the 160-acre farms.

Contract services.--Operators rely less upon outside agencies for contract services as farm size increases. The 80-acre farm contracted both cotton

TABLE 27

Variable Expenses: Power, Equipment, and Irrigation Water, 320-acre Farm
1953 and 1955

Item	1953			1955		
	Fuel & lube a/	Repairs	Total	Fuel & lube a/	Repairs	Total
	1	2	3	4	5	6
	dollars					
Power:						
T-5D tractor	180.00	225.00	405.00	189.15	225.00	414.45
W-1 tractor	207.38	85.00	292.38	197.65	75.00	272.65
W-2 tractor	588.63	200.00	788.63	467.70	200.00	667.70
Pickup (1/2 ton)	300.00	100.00	400.00	300.00	100.00	400.00
Truck (1 1/2 ton)	200.00	84.00	284.00	200.00	84.00	284.00
Subtotal			2,170.01			2,038.80
Equipment:						
5' ditcher		4.20	4.20		4.20	4.20
5' scraper		4.50	4.50		4.50	4.50
Plow, 2 way/2-16"		82.50	82.50		82.50	82.50
8' chisel		52.50	52.50		52.50	52.50
7 1/2' offset disk		97.50	97.50		97.50	97.50
7' tandem disk		75.00	75.00		75.00	75.00
Spiketooth harrow		1.80	1.80		1.80	1.80
10' cultipacker		32.50	32.50		32.50	32.50
4-row lister planter		55.00	55.00		55.00	55.00
4-row cultivator		400.00	400.00		400.00	400.00
4-row fertilizer attachment		30.00	30.00		30.00	30.00
1-row cotton picker		1,455.00	1,455.00		1,455.00	1,455.00
5-bale cotton trailer		48.00	48.00		48.00	48.00
2-row stalk cutter		16.25	16.25		16.25	16.25
7' power mower		35.00	35.00		35.00	35.00
8' side delivery rake		52.00	52.00		52.00	52.00
2-wire hay baler		166.25	166.25		166.25	166.25
Subtotal			2,608.00			2,608.00
	Lube & power b/			Lube & power b/		
Irrigation water:						
Pumping plant	2,380.00	216.00	2,596.00	2,465.44	216.00	2,681.44
Pipeline		57.78	57.78		57.78	57.78
Alfalfa valves		18.56	18.56		18.56	18.56
Subtotal			2,672.34			2,757.78
Total variable expenses, all items			7,450.35			7,404.58

a/ T-5D: $ .50 per hour
W-1: $ .40 per hour
W-2: $ .60 per hour
Pickup: $ .025 per mile
Truck: $ .04 per mile

b/ Power and lube costs obtained as follows:
Power cost = sum of following charges:
(1) Service charge ($128 for 20 h.p. motor)
(2) First 1,000 kw-hrs @ $ .014 per h.p.
(3) Second 1,000 kw-hrs @ $ .0085 per h.p.
(4) Remaining kw-hrs @ $ .006 per h.p.
Lube cost = 1 percent of power cost.

$$\text{Kw-hrs} = \frac{\text{Rated h.p.} \times 100 \times .746 \times \text{hrs. pumped}}{\text{Motor efficiency}}$$

TABLE 28

Unit Costs [a]: Power, Equipment, and Irrigation Water, 320-acre Farm; 1953 and 1955

Item	Unit	Fixed cost per unit		Variable expense per unit		Total cost per unit	
		1953	1955	1953	1955	1953	1955
	1	2	3	4	5	6	7
		dollars					
Power:							
T-5D tractor	hour	2.65	2.51	1.12	1.10	3.77	3.61
W-1 tractor	hour	.80	.83	.56	.55	1.36	1.38
W-2 tractor	hour	.97	1.22	.80	.86	1.77	2.08
Pickup	mile	.04	.04	.03	.03	.07	.07
Truck	mile	.08	.08	.06	.06	.14	.14
Equipment:							
5' ditcher	hour	.59	.64	.13	.14	.72	.78
5' scraper	hour	.63	.69	.14	.15	.77	.84
Plow, 2 way/2-16"	hour	.77	.77	.85	.83	1.62	1.60
8' chisel	hour	2.02	1.99	1.47	1.44	3.49	3.43
7 1/2' offset disk	hour	.56	.53	.60	.59	1.16	1.12
7' tandem disk	hour	2.40	1.40	2.61	1.52	5.01	2.92
Spiketooth harrow	hour	.15	.11	.03	.02	.18	.13
10' cultipacker	hour	1.27	2.30	.93	1.67	2.20	3.97
4-row lister planter	hour	.93	.91	.67	.66	1.60	1.57
4-row cultivator	hour	.90	1.10	1.30	1.60	2.20	2.70
4-row fertilizer attachment	hour	.35	.33	.51	.48	.86	.81
1-row cotton picker	hour	5.05	9.13	4.03	7.27	9.08	16.40
5-bale cotton trailer	hour	1.81	3.28	.25	.44	2.06	3.72
2-row stalk cutter	hour	.69	1.24	.25	.45	.94	1.69
7' power mower	hour	.25	.25	.18	.18	.43	.43
8' side delivery rake	hour	.44	.44	.33	.33	.77	.77
2-wire hay baler	hour	2.84	2.84	.78	.78	3.62	3.62
Irrigation water:	acre foot	3.07	2.88	2.90	2.82	5.97	5.70

[a] Rounded.

picking and hay baling; the 160-acre farms did not require custom picking, and the 320-acre farm used neither of these services. On the other hand, the larger farms contracted for defoliation.

Contract services accounted for 34 percent of total variable expenses for producing cotton [1] (Table 29). Cotton yields increased from 1.3 to 1.6 bales per acre between 1953 and 1955, and ginning, insurance, and storage costs increased accordingly. Alfalfa production required only one contract service, roadsiding; this accounted for 19 percent of total variable expense for alfalfa. Alfalfa yields increased from 5.25 to 5.5 tons per acre; this gain raised harvesting costs slightly.

Contract services in barley and corn production accounted for roughly 30 percent and 41 percent of total variable expenses for these crops.

Total Costs Rose Slightly in 1955

Total fixed costs for the 320-acre farm, excluding the cost of establishing alfalfa, were as follows in 1953 and 1955:

Item	Total fixed cost
Power	$ 3,165.90
Equipment	3,726.16
Irrigation system	2,823.37
Real estate taxes	2,080.00
Office costs	300.00
Improvements	758.33
Total [2]	$12,853.76
Per acre	40.17

---

[1] The corresponding percentage on 160-acre farms was 30 percent. Actual costs for contract services were about equal on these farms, but total per acre variable expenses were lower on the 320-acre farm (Tables 22 and 29).

[2] Includes $2,202 as the imputed interest charge or "opportunity cost" for use of the operator's fixed capital, figured at the rate of 5 percent of average investment.

TABLE 29

Input Costs by Crops and Total Farm, 320-acre Farm; 1955 and 1953

Item	Cotton		Alfalfa		Irrigated pasture		Ensilage corn		Barley		Total farm
	1955										
	(72 acres)		(110 acres)		(40 acres)		(60 acres)		(40 acres)		
	per acre	total	per acre	total	per acre	total	per acre	total	per acre	total	
	1	2	3	4	5	6	7	8	9	10	11
					dollars						
Fixed:	72.85	5,245.40	47.73	5,250.46	36.49	1,459.86	26.02	1,561.37	13.84	553.68	14,070.77
Variable:											
Power	10.63	765.36	5.21	573.10	3.28	131.20	5.61	336.60	3.14	125.60	1,931.86
Equipment	27.21	1,959.45	2.26	248.60	1.67	66.80	3.88	233.08	1.00	40.41	2,548.34
Materials	24.70	1,778.40	13.18	1,449.80	23.10	924.00	24.76	1,485.60	5.54	221.60	5,859.40
Labor	27.99	2,015.62	21.46	2,360.19	23.29	931.46	13.66	819.53	6.69	267.46	6,394.26
Contracts	50.33	3,623.94	9.62	1,058.20			34.81	2,088.90	7.72	308.88	7,079.92
Total variable	140.86	10,142.77	51.73	5,689.89	51.34	2,053.46	82.72	4,963.71	24.09	963.95	23,813.78
Total cost	213.71	15,388.17	99.46	10,940.35	87.83	3,513.32	108.74	6,525.08	37.93	1,517.63	37,884.55
	1953										
	(130 acres)		(110 acres)		(35 acres)		(- - - -)		(- - - -)		
Fixed:	56.71	7,373.12	48.49	5,333.81	38.87	1,360.45					14,067.38
Variable:											
Power	10.54	1,370.20	5.28	580.80	3.35	117.25					2,068.25
Equipment	16.89	2,196.53	2.26	248.60	2.57	89.95					2,535.08
Materials	23.15	3,009.50	13.36	1,469.60	23.52	823.20					5,302.30
Labor	26.46	3,439.88	21.53	2,368.33	23.36	817.62					6,625.83
Contracts	45.22	5,879.18	9.19	1,010.90							6,890.08
Total variable	122.26	15,895.29	51.62	5,678.23	52.80	1,848.02					23,421.54
Total cost	178.97	23,268.41	100.11	11,012.04	91.67	3,208.47					37,488.92

The total per acre fixed costs and per acre variable expenses of producing cotton increased between 1953 and 1955 (Table 29). The increase was due almost entirely to increased per acre fixed costs for cotton equipment. Variable expenses per acre rose from $122 to $141. Equipment costs, due to less complete use of equipment, accounted for $10 of this increase. Per acre costs of power, materials, and labor did not change materially. Higher contract costs accounted for $5 of the variable cost per acre increase.

Per acre fixed costs and variable expenses for alfalfa and irrigated pasture were about the same in 1953 and 1955. Corn and cotton stand in supplementary cost relationship to each other. This is because many of the same equipment items required for cotton production can also be used in corn production. Correspondingly, corn and barley production tended to reduce per acre cotton production costs by spreading fixed costs over more acres. Cotton production cost per acre will vary, depending on the substitute crops that the farmer selected. If alfalfa had been grown on the diverted acreage, a different cost effect would have resulted; per acre cotton costs would have been greater and per acre alfalfa costs less. The importance of substitute crops is due partly to their effects on total costs.

Yield and Price Increases Also Contributed to Higher Earnings on 320-acre Farms

Total gross receipts increased by $3,850 between 1953 and 1955 (Table 30). As on the smaller farms, higher yields and higher prices for the primary crops more than offset the income-depressing effect of reduced cotton acreage.

If yields and prices of cotton and alfalfa had not increased in 1955, total gross receipts would have been $38,770, a drop of $8,727 from observed 1955 receipts. Price and yield increases for the 1955 cotton crop avoided 63 percent of this otherwise sharp reduction. The following text table lists the gross

receipts which would have occurred under varying possible price and yield changes for both cotton and alfalfa hay.

Conditions	Gross receipts in 1955 a/	Reduction from observed gross receipts
	1	2
	dollars	
Observed change in YIELD and PRICE of:		
Cotton and alfalfa	47,497	
No change in YIELD and PRICE of:		
Cotton and alfalfa	38,770	8,727
Cotton alone	42,026	5,471
Alfalfa alone	44,241	3,256
No change in PRICE of:		
Cotton and alfalfa	43,069	4,428
Cotton alone	45,731	1,766
Alfalfa alone	44,835	2,662
No change in YIELD of:		
Cotton and alfalfa	42,746	4,751
Cotton alone	43,461	4,036
Alfalfa alone	46,782	715

a/ Rounded.

Total costs for the farm, less land interest, increased $396 between 1953 and 1955 (Tables 29 and 30), while gross receipts were increasing $3,850. Receipts-minus-costs, therefore, were $3,474 higher in 1955 (Figure 8). The following per acre summary illustrates the costs and returns by crops:

	Cotton		Alfalfa		Irrigated pasture		Corn (ensilage)	Barley
Per acre	1953	1955	1953	1955	1953	1955	1955	1955
	1	2	3	4	5	6	7	8
	dollars							
Gross receipts	222.97	298.96	113.40	143.00	62.50	62.50	97.50	47.30
Variable expenses a/	122.26	140.86	49.00	48.98	52.80	51.34	82.72	24.09
Balance	100.71	158.10	64.40	94.02	9.70	11.16	14.78	23.21
Fixed costs	56.71	72.85	48.49	47.73	38.87	36.49	26.02	13.84
Balance	44.00	85.25	15.91	46.29	-29.17	-25.33	-11.24	9.37

a/ When we deduct from the above variable expenses, the allocated costs of "general" truck use and accompanying labor, Social Security, and interest charges, the remaining per acre variable expenses include only direct production costs. These are as follows:

Crops	1953	1955
Cotton	117.21	136.04
Alfalfa	45.55	45.74
Irrigated pasture	49.35	48.10
Corn	--	79.38
Barley	--	20.75

TABLE 30

Gross Receipts, Costs, and Earnings by Crops and Total Farm, 320-acre Farm; 1955 and 1953

Item	1955						
	Cotton		Alfalfa	Irrigated pasture	Corn (ensilage)	Barley	Total farm
	lint	seed					
	1	2	3	4	5	6	7
Acres	72		110	40	60	40	290
Yield	1.6 bales[a/]	.68 tons[b/]	5.5 tons	5,000 TDN[c/]	15 tons	22 cwt.	
Production	115.2 bales	48.96 tons	605 tons	200,000 TDN	900 tons	880 cwt.	
Price	$167.30/bale	$46.00/ton	$26.00/ton	$5.00/400 TDN	$6.50/ton	$2.15/cwt.	
Gross	$19,272.96	$2,252.16					
Gross receipts	$21,525.12		$15,730.00	$ 2,500.00	$ 5,850.00	$1,892.00	$47,497.12
Costs (less land)	15,388.19		10,940.35	3,513.32	6,525.08	1,517.63	37,884.55
Receipts minus costs	$ 6,136.95		$ 4,789.65	$-1,013.32	$ -675.08	$ 374.37	$ 9,612.57
Land interest ($300/acre d/ at 5%)	1,365.00		1,745.00	695.00	647.50	347.50	4,800.00
Net	$ 4,771.95		$ 3,044.65	$-1,708.32	$-1,322.58	$ 26.87	$ 4,812.57
Add:							
Interest on fixed capital (incl. land)							7,001.65
Operator's labor e/							2,213.78
Net farm income							$14,028.00
Less:							
Operator's labor (imputed)							2,500.00
Return to capital and management							$11,528.00
Rate earned on investment							8.25%

(Continued on next page.)

Table 30 continued.

Item	1953						
	Cotton		Alfalfa	Irrigated pasture	Corn (ensilage)	Barley	Total farm
	lint	seed					
	1	2	3	4	5	6	7
Acres:	130		110	35			290
Yield	1.3 bales[a]	.552 tons[b]	5.25 tons	5,000 TDN[c]			
Production	169 bales	71.82 tons	577.5 tons	175,000 TDN			
Price	$148.99/bale	$53.00/ton	$21.60/ton	$5.00/400 TDN			
	$25,179.31	$3,806.46					
Gross receipts	$28,985.77		$12,474.00	$ 2,187.50			$43,647.27
Costs (less land)	23,268.41		11,012.04	3,208.47			37,488.92
Receipts minus costs	$ 5,717.36		$ 1,461.96	$-1,020.97			$ 6,158.35
Land interest ($300/acre d/ at 5%)	2,287.50		1,818.75	693.75			4,800.00
Net	$ 3,429.86		$ -356.79	$-1,714.72			$ 1,358.35
Add:							
Interest on fixed capital (incl. land)							7,001.65
Operator's labor e/							2,500.00
Net farm income							$10,860.00
Less:							
Operator's labor (imputed)							2,500.00
Return to capital and management							$ 8,360.00
Rate earned on investment							5.98%

a/ 500 lb. bales (lint: 478 lbs.; bagging and ties: 22 lbs.).

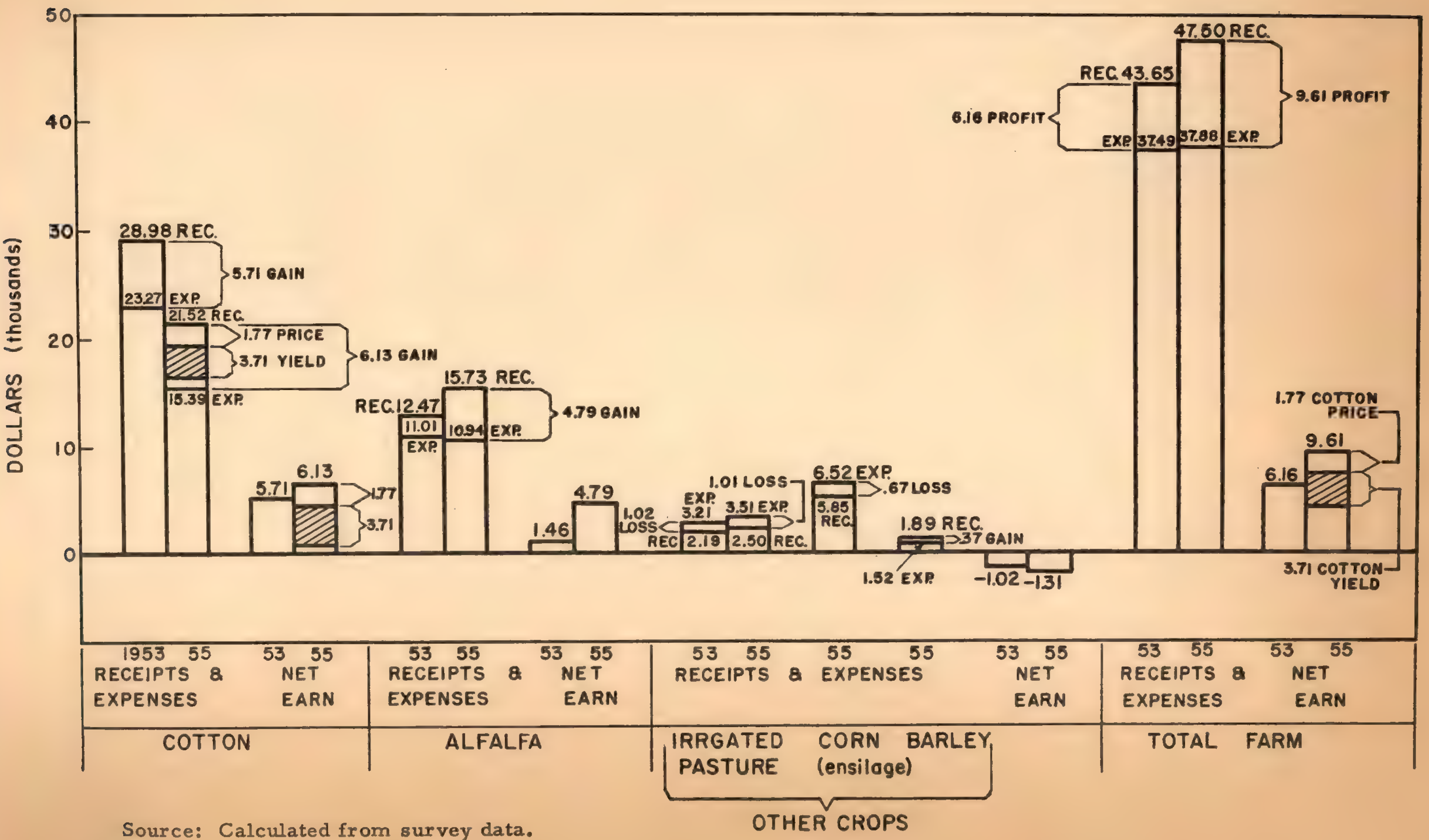
b/ 850 pounds or 0.425 tons of seed per bale of lint.

c/ Total digestible nutrient.

d/ Bare land was valued at an arbitrary figure of $300 per acre. This value was estimated from available rental and assessment values and is the figure used for Grades I and II based on all farm models. We found it impossible to obtain a realistic current market value of land in Central subarea since property does not change hands frequently enough to suggest an average sale value. We do not present the $300 estimate as a precise market value. Readers should not interpret it as such.

e/ Includes total operator's labor used in producing crops and in establishing 1/4 of total alfalfa acreage.

Figure 8. Changes in Gross Receipts, Expenses, and Net Returns on 320-acre Farm in Central San Joaquin Valley, 1953-1955 (in thousands dollars).



Source: Calculated from survey data.

The gross receipts from all crops covered their respective variable expenses in both 1953 and 1955, but the balance was higher in 1955 for the crops produced in both years. The costs of producing cotton increased, but the increase in cotton receipts was relatively greater. Alfalfa costs remained the same while receipts from this crop increased; irrigated pasture costs declined while receipts remained unchanged. Per acre cotton returns were higher than those of any other crop in both years.

Net receipts for the farm were $1,358 in 1953 and $4,813 in 1955 (Table 30). Net farm income also rose, from $10,860 to $14,028. Net farm income was lower in 1955, however, than it would have been if the operator had used the same amount of labor in both years. Net cash income amounted to $17,702 in 1953 and $20,887 in 1955. The return to capital and management increased from $8,360 to $11,528 between these years (Table 30).

On this farm, as on the smaller models, increased yields and prices in 1955 prevented what would have otherwise been a drop in net farm earnings. If there had been no yield increases for cotton and alfalfa, the return to capital and management would have been $6,787 and the rate of earnings, 4.8 percent. With neither yield nor price gains, profit would have been $2,801, or 2.0 percent on total investments. A comparison of earnings on the three different-sized farms reveals that dollars of profit and the earnings rate were higher on the 320-acre farm in 1955 than for the smaller farms. The 320-acre farm would have had higher profits than the other organizations, even without the observed price increases.

SUMMARY AND CONCLUSIONS

The physical environment in the Central San Joaquin Valley is favorable for producing cotton and other irrigated crops. Temperature conditions, however, are less favorable for cotton than in other subareas lying to the south. Moisture is the limiting factor; complete irrigation is essential during the summer. Competition among crops for irrigation water and its cost tends to limit growers in producing high-water-use crops and in expanding the present cropping system.

During 1954 and 1955, most farmers made only partial adjustments to cotton allotments rather than changes requiring a complete farm reorganization. Producers did not shift to lines of production which would have required additional investment and/or a waiting period before returns materialized. They devoted the acreage diverted from cotton primarily to annual grain crops, or to alfalfa and irrigated pasture. Also, they increased fallow land acreage after 1953.

Increased cotton yields offset approximately one-fourth of the total cotton production decrease that reduced acreage otherwise would have brought between 1953 and 1955. 1/ These higher yields reflected increased fertilizer and irrigation water applications, more effective cropping systems, and better timing of seedbed preparation and cultivation.

1/ The yields used in this analysis range from 1.25 to 1.6 bales, or 598 to 765 pounds, per acre. Recent cotton yield experience indicates that these figures are below those for 1956 and 1957. The State yields for 1956 averaged 924 pounds per acre and the estimated 1957 yield was 1,006 pounds per acre. (California Crop and Livestock Reporting Service, California Department of Agriculture and U. S. Department of Agriculture.)

The representative cotton farms used in this study had the following investments and fixed costs in 1953 and 1955, excluding land:

Farm	Average investment a/		Fixed costs	
	total	per acre	total	per acre
	1	2	3	4
80-acre	$11,089	$132	$ 3,640	$46
160-acre	22,516	141	7,829	49
320-acre	43,694	137	14,071	44

a/ We estimated bare land value at $300 per acre, in addition to these investments, for purposes of calculating earnings measures and making comparisons.

Cotton acreage reductions resulted in lower annual use of rowcrop power and equipment items. However, other equipment items, such as hay harvesting machinery, were used more intensively. Variable expenses did not decline proportionately to decreased equipment use, due to reasonably constant repair costs.

Central subarea farmers used irrigation facilities more extensively after allotments. Two reasons explain this: (a) an increase in the rate of application of water on cotton allotment acreage, and (b) higher water requirements under the changed cropping system. This increased water use resulted in lower water costs per acre foot.

As farm size increases above 80 acres, it becomes more economical to own harvesting equipment rather than to contract harvesting. The choice between owning and contracting depends on the number of acres actually in cotton. The 80-acre farm operator contracted most of his cotton, corn, and alfalfa harvesting, while the 160- and 320-acre farm operators owned their own equipment.

The total per acre variable expenses for producing cotton increased between 1953 and 1955 due to: (1) higher unit costs of power and equipment, (2) additional fertilizer and water input costs, and (3) higher harvesting and processing costs accompanying increased yields. Variable expenses for producing an acre of cotton were higher on the smaller-sized farms than on the larger ones.

Total receipts increased significantly on the 320-acre farm between these years, partly because the 320-acre operator double-cropped 40 of his diverted cotton acres. To maintain farm earnings under allotments, cotton producers make every economic effort to increase, or to at least maintain, gross receipts.

Two developments prevented a serious drop in total receipts on the 160-acre farms, and also were responsible for increased total receipts on the 80- and 320-acre farms: (1) Prices and Yields for both cotton and alfalfa increased in 1955.[1] (2) Growers were able to find uses for diverted acres that would return more in gross receipts than variable expense outlays, and, therefore, they planted most of these acres, and obtained revenues from them.

Farm earnings for the four farm models were as follows:

Farm	1953				1955			
	Net a/ cash income	Net b/ farm income	Profit c/	Rate d/ earned	Net a/ cash income	Net b/ farm income	Profit c/	Rate d/ earned
	1	2	3	4	5	6	7	8
	dollars			percent	dollars			percent
80-acre	2,621	937	-1,563	-4.4	3,841	2,208	-292	-0.8
160-1 acre	8,113	4,287	1,787	2.5	7,933	4,109	1,609	2.3
160-2 acre	8,113	4,287	1,787	2.5	8,561	4,736	2,236	3.2
320-acre	17,702	10,860	8,360	6.0	20,887	14,028	11,528	8.2

a/ (Total gross receipts) minus (all cash costs).

b/ (Total gross receipts) minus (all cash costs, plus depreciation). Net farm income is the return to the operator for his labor, management, and capital.

c/ (Net farm income) minus (the estimated value of the operator's labor, 2,500 hours at $1.00 per hour). Profit is the return to the operator for his capital and management.

d/ Profit expressed as a percentage of total farm investment.

Earnings were higher after allotments on all but the 160-1 farm. Cotton was the most profitable crop in 1953 and 1955. Cotton and alfalfa yield

---

[1] Cotton receipts increased $15.34 per bale and alfalfa hay $4.40 per ton. The cotton gain reflects higher lint and lower cottonseed prices. The lower seed price was more than offset by the gain in lint prices.

increases in 1955 had highly favorable effects on rates of farm earnings. This is evident in the following table showing actual rates in 1953 and 1955 along with what 1955 rates earned would have been without the yield gains:

Farm	Rate of earnings in:		
	1953	1955 (with a yield increase)	1955 (without a yield increase)
	1	2	3
	percentages		
80-acre	-4.4	-0.8	-4.3
160-1 acre	2.5	2.3	-0.1
160-2 acre	2.5	3.2	-0.01
320-acre	6.0	8.2	4.8

Our analysis points to certain definite conclusions regarding the effects of acreage allotments, and farmer adjustments to them, from 1953 to 1955. These findings, of course, apply specifically to the three farm models studied, the 80-, 160-, and 320-acre farms in the Central San Joaquin Valley. We developed these models so that they fairly reflect conditions and earnings on similar-sized farms in Central subarea. They do not represent an average of ALL farms in the respective sizes, however.

(1) Cotton was the most profitable field crop with a reasonably broad market before allotments for all farm sizes studied, and after allotments for all except the 160-acre models. Except for alfalfa hay, farmers failed to find an alternative crop for diverted acres that would cover the total of variable expenses and fixed costs.

(2) The exception for alfalfa hay, making it more profitable than cotton for the 160-acre farms, resulted chiefly from two facts: (a) cotton fixed costs per acre and bale rose sharply following allotments due to the smaller volume to absorb costs for the owned cotton harvester, and (b) alfalfa hay gross receipts and net returns rose appreciably due to higher yields and prices.

(3) Few farmers undertook long-range adjustments involving major reorganization or heavy capital investments during the two years studied. They emphasized, instead, short-term adjustments such as improved production methods on crops already in the cropping system, and adding crops requiring similar resources and practices.

(4) The most effective adjustment on all farm sizes was to increase yields per acre for cotton and alfalfa hay, without increasing variable expenses in the same proportions. Farmers have succeeded in obtaining further marked cotton yield gains in 1956 and 1957, as indicated by state average data. We do not know the exact amount of such gains in Central subarea, the costs involved in yield increases obtained, nor how much farther it is economic for growers to extend such improvements. Certainly there are limits to the possibilities of increasing profits by obtaining higher yields on fixed acreages!

(5) The smallest farm had the highest cotton production costs per acre in 1953, and these costs decreased as farm size increased through the 160- to the 320-acre unit. These costs increased from 1953 to 1955 for all models, but the 160-acre farm had the highest costs in 1955, due to the previously-mentioned higher per unit cost for the machine harvester.

(6) Favorable price changes--rises--for cotton lint and alfalfa hay acted to offset much of the cotton acreage cut. Farmers cannot expect such rises to continue; neither can they be sure that declines will not occur.

(7) Cotton acreage reductions tend to increase cotton equipment production costs per unit on particular farm sizes. They, therefore, constitute a force to encourage larger farms, but fewer numbers.

(8) Our study does not reveal what are the BEST adjustments according to farm size. We are convinced that farmers will continue to seek profitable adjustments to acreage allotments and any other major problem-creating force. We suspect that many of these adjustments will involve long-term changes in production organization and investments.

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FARM ADJUSTMENTS AND EARNINGS UNDER 1955 COTTON ACREAGE ALLOTMENTS

5. San Joaquin Valley Westside Cotton Farms, 1953–1955

Douglas D. Caton
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FARM ADJUSTMENTS AND EARNINGS UNDER 1955 COTTON ACREAGE ALLOTMENTS

5. San Joaquin Valley Westside Cotton Farms, 1953-1955

HERE ARE THE HIGHLIGHTS OF THE FINDINGS:

PRODUCTIVE SOILS AND COSTLY WATER feature the Westside; most growers pump irrigation water from deep wells -

See pages 9-15

LACK OF PROFITABLE ALTERNATIVE CROPS and unique tenure and capital cost features discourage Westside growers from long-term adjustments -

See pages 16-18

LARGE OPERATIONS dominate the Westside, with relatively few growers operating most of the cropland, and growing the bulk of the cotton -

See pages 22-24

COTTON CUTS totaled 44 percent from 1953 to 1955 -

See page 24

FALLOW, BARLEY, GRAIN SORGHUM absorbed most of the diverted acres on the Westside -

See pages 25-27

INTERMEDIATE-SIZED farms--of 1,100 and 2,800 acres--receive detailed attention in this analysis -

See pages 28-30

HIGH INVESTMENTS and costs for irrigation facilities and operating equipment occurred on both 1,100- and 2,800-acre farms -

See pages 32-35 and 62-64

HIGHER FIXED COSTS per hour of use and per acre in 1955 reflect reduced use--due to fewer cotton acres and less demand by substitute crops -

See pages 39-41

INCREASES IN FERTILIZER and irrigation water, plus improved land use and practices, enabled farmers to obtain higher cotton yields after allotments -

See pages 51, 92, 97, and 102

LOWER PROFITS in 1955 for 1,100-acre, 2,800-1, and 2,800-3 farms reflected cotton acreage cuts and occurred in spite of higher prices and yields; alternatives were less profitable than cotton -

See pages 54-57 and 89-103

SUGAR BEETS were more profitable than barley; this enabled the 2,800-2 farm to obtain higher profits in 1955 than for 1953 -

See pages 89-103

FARM ADJUSTMENTS AND EARNINGS UNDER 1955 COTTON ACREAGE ALLOTMENTS

5. San Joaquin Valley Westside Cotton Farms, 1953-1955 [1]

Douglas D. Caton [2]
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W. Neill Schaller [2]

ACREAGE ALLOTMENTS BROUGHT IMPORTANT CHANGES IN HOW WESTSIDE FARMERS USED THEIR LAND AND OTHER RESOURCES

Cotton Acreage Cuts Were Drastic; Farmers Had Difficulty in Finding Replacement Crops

The Secretary of Agriculture reintroduced cotton acreage allotments in 1954, and reduced them further in 1955. These actions required cotton producers to cut down cotton acreage and find new crops. [4] The consequent adjustments have

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[1] This is the fifth of a series based on detailed investigations of the changes in farm organization, production, and earnings under the cotton acreage allotments beginning in 1954. This research comes under California Agricultural Experiment Station Project Number 1641 and is partially supported under Line Project PE e3-5(w), Farm Economics Research Division, Western Field Research Section, U. S. Department of Agriculture. The order of listing for the authors does not imply seniority of authorship.

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[4] Cotton acreage allotments and marketing quotas originated with the Agricultural Adjustment Act of 1938 and are governed today by this statute, its amendments, and a body of related laws passed since 1938. When quotas are deemed necessary by the Secretary of Agriculture due to a surplus over needs, they must be approved by a vote of two-thirds of the nation's cotton producers. If the quota is not approved, the price support for the crops is reduced to about 50 percent of parity. See Commodity Stabilization Service, U. S. Department of Agriculture, Compilation of Statutes Relating to Soil Conservation, Marketing Quotas and Allotments, Crop Insurance, Sugar Payments and Quotas, Price Support, Commodity Credit Corporation, and Related Statutes--as of January 1, 1957, Agricultural Handbook No. 113, pp. 53-64.

affected resource use and net income for Westside cotton farmers, as for those in other areas of California and the rest of the United States. Cotton is the most important crop in California (Table 1). These Westside cotton growers, like other farmers, operate for the purpose of obtaining net farm income, or profit. We assume that they hope to get the maximum profits over time. If so, two questions demand answers: (1) "What have been the actual effects of reduced cotton acreage beginning in 1954?" and (2)"What is the optimum adjustment that the farmer can make in order to maximize his profits over time?" This study will concentrate on the first question.

The Secretary announced acreage allotments in 1950 for the first time after World War II; allotments totaled 21,000,000 acres in that year (prior to World War II, upland cotton growers had operated under acreage allotments from 1938-1942). It was obvious, by midsummer in 1953, that the Secretary would find it necessary to announce marketing quotas and, that, if these met approval, acreage allotments would follow. Farmers approved the marketing quotas in December 1953, and the Secretary of Agriculture promptly announced a national acreage allotment of 21,379,000 acres of cotton for 1954. Allotments have continued in each succeeding season. The total was 18,113,000 acres in 1955, 17,391,000 in 1956, 17,600,000 in 1957, and 17,400,000 acres in 1958. U. S. farmers reduced the total cotton grown in the latter two seasons by participating in the acreage reserve program. They signed up 3.1 million acres in 1957 and 4.9 million in 1958. The total United States acreage planted estimate as of July 1, 1958, was only 12.4 million acres, down 1.6 million from a year earlier. This represents the lowest cotton acreage in 80 years. California cotton grower participation in the acreage reserve program is relatively small.

TABLE 1

California Cotton Acreage, Yields, Prices, and Total Value, 1953-1957

Cotton	Units	1953	1954	1955	1956	1957[a]
	1	2	3	4	5	6
Acres harvested	1,000 acres	1,340	883	745	749	716
Lint yield per acre	pounds	632	806	774	924	1,006
Total lint production	1,000 bales	1,768	1,487	1,205	1,446	1,500
Price per pound	dollars	.3117	.3332	.3308	.3265	.3620
Total lint value	1,000 dollars	275,488	247,677	199,322	236,027	271,556
Seed yield per acre	pounds	1,076	1,402	1,329	1,509	1,704
Total seed production	1,000 tons	721	619	495	565	610
Price per ton	dollars	53.10	59.20	46.10	62.10	52.70
Total seed value	1,000 dollars	38,287	36,645	22,820	35,086	32,147
Total value, lint and cotton seed	1,000 dollars	313,775	284,322	222,142	271,113	303,703
Total value, all crops from farm marketings	1,000 dollars	1,662,660	1,613,574	1,692,469	1,829,774	1,752,606
Value of cotton as percent of value of all crops	percent	18.9	17.6	13.1	14.8	17.3
Total value all commodities from farm marketings	1,000 dollars	2,633,910	2,518,384	2,640,728	2,819,695	2,774,194
Value of cotton as percent of value of all commodities	percent	11.9	11.3	8.4	9.6	10.9

[a] Preliminary for 1957.

Source: (1) Value, all crops; and Value, all commodities, Farm Income Situation Reports, U. S. Agricultural Marketing Service. (2) All other data, California Crop and Livestock Reporting Service.

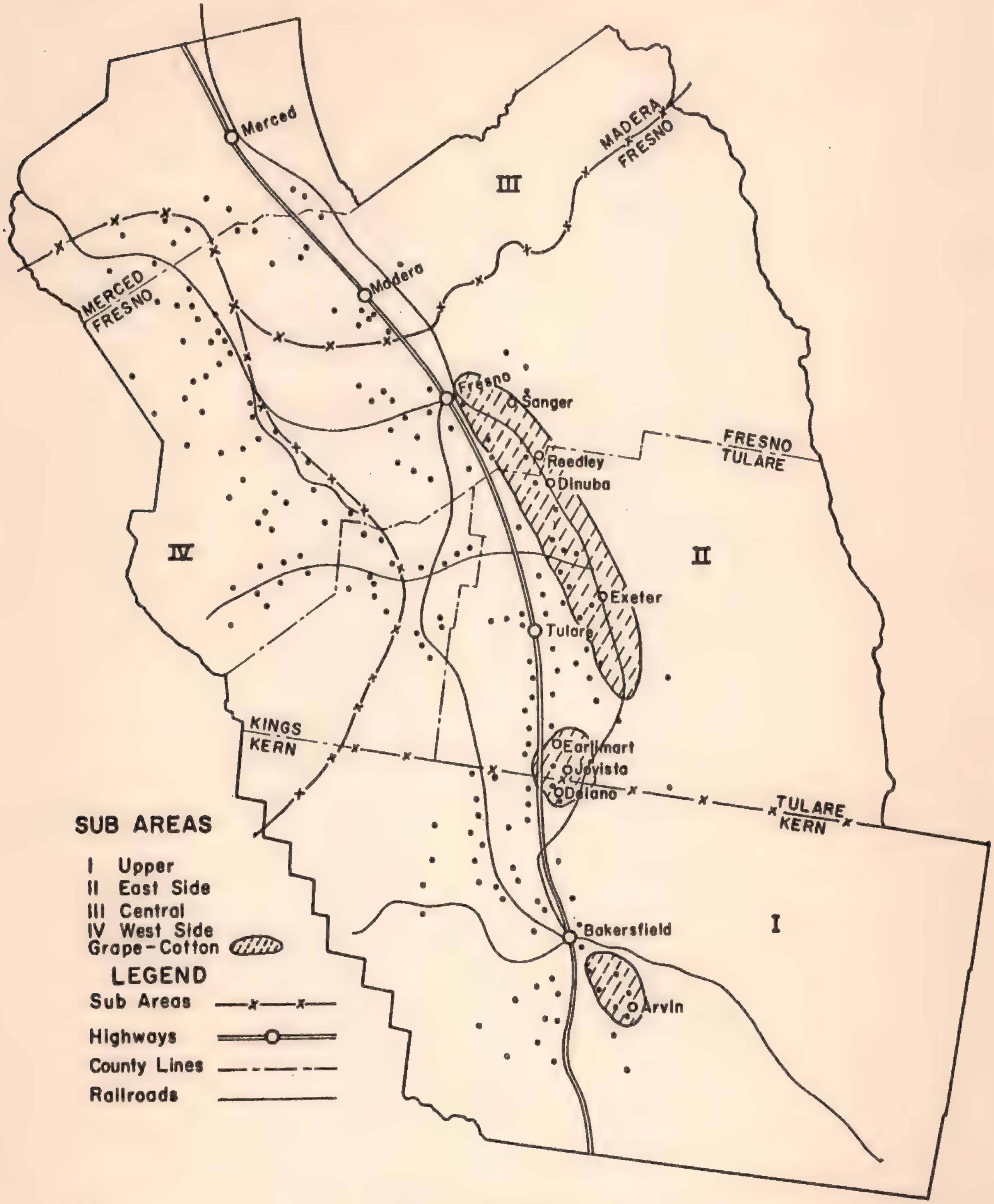
We Made This Study to Determine How Cotton Acreage Allotments Affected Farm Organization and Earnings Between 1953 and 1955

The objective of this study is to discover how cotton acreage allotments affected farm resource use and earnings on the San Joaquin Valley Westside. We planned the study to discover facts about both the physical changes farmers made in their cropping systems and production methods, and the financial or economic effects of both these changes and other off-farm influences. Among the latter, price variations for products sold, and materials and services used, rank high as profit-affecting forces.

Cotton Growers, Farm Supply Agencies, and Official Sources Provided Facts

This particular study is one segment of an over-all analysis that includes the entire San Joaquin Valley, the largest cotton producing area in California. The "Westside" requires special analysis because growers in this subarea produce cotton under different conditions than those in any other part of California, and under sharply different conditions from those in the eastern part of the United States. The term "Westside" demands clarification. We defined this subarea, for purposes of this study, as including the western portion of Fresno County, lying west of the San Joaquin River and the slough extending southerly from a point west of Fresno, and portions of Merced, Kings and Kern counties (Figure 1). The two most important facts about the Westside in terms of physical conditions concern soils and water. This analysis, thus, is concerned with the western portion of the San Joaquin Valley in which water is relatively scarce and expensive, but in which much of the soil area is highly productive when planted to cotton. In addition to the area identified as Westside, certain other parts of the San Joaquin Valley, for example Wheeler Ridge in southern Kern County, also have similar conditions. Although this study did not specifically include detailed information about such localities, those concerned may find our analysis applicable to them.

Figure 1. Cotton Gins in the San Joaquin Valley by Subareas



Source: Cotton Gins, Courtesy Southern Pacific Railway Co.

The third important fact about Westside cotton farming is that individual farming operations are much larger than those in the rest of the San Joaquin Valley. [1] We recognized this in selecting the farm models for our analysis. These include the following:

Number of models	Type of organization	Acres
1	Cotton-barley	1,100
1	Cotton-barley	2,800
1	Cotton-barley-sugar beets	2,800
1	cotton-barley-melon	2,800

We used detailed local information to develop the major characteristics of these four farm models. Thus we have obtained detailed soils information from the U. S. Department of Agriculture and the University of California Soils Survey Report. Studies and reports by the U. S. Department of the Interior, Geological Survey and the California Division of Water Resources, and Reclamation Bureau Studies supplied us with background information on water conditions. We also obtained climatological information from U. S. Weather Bureau Reports and publications such as Climatological Data.

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[1] Studies of allotment effects in the Upper, Eastside, and Central San Joaquin Valley, previously released, are part of this project. Hedges, Trimble R., Farm Adjustments and Earnings under 1955 Cotton Acreage Allotments. 1. Upper San Joaquin Valley Cotton Farms, 1953-55, Calif. Agr. Exp. Sta., Giannini Foundation of Agricultural Economics, Mimeo. Report No. 191, December, 1956. Athanassatos, D. C. and T. R. Hedges, Farm Adjustments and Earnings under 1955 Cotton Acreage Allotments. 2. Small Grape-Cotton Farms on the San Joaquin Valley Eastside, 1953-1955, Calif. Agr. Exp. Sta., Giannini Foundation of Agricultural Economics, Mimeo. Report No. 194, May, 1957. Caton, Douglas D., Trimble R. Hedges, and W. Neill Schaller, Farm Adjustments and Earnings under 1955 Cotton Acreage Allotments. 3. Eastside San Joaquin Valley Cotton Farms, 1953-1955, Calif. Agr. Exp. Sta., Giannini Foundation of Agricultural Economics, Mimeo. Report No. 202, May, 1958. Caton, Douglas D., Trimble R. Hedges, and W. Neill Schaller, Farm Adjustments and Earnings under 1955 Cotton Acreage Allotments. 4. Central San Joaquin Valley Cotton Farms, 1953-1955, Calif. Agr. Exp. Sta., Giannini Foundation of Agricultural Economics, Mimeo. Report No. 208, July, 1958.

Valuable facts on land use, crop acreages and cropping systems came from the aggregate records in the county offices of the California Agricultural Stabilization and Conservation Committee. It was possible, in addition, to reinforce this information with the result of questionnaire returns by individual farmers participating in the cotton allotment program. Farmers themselves were the final authority in regard to resource use, farm organization, cropping systems, and the technology and practices used in production. A sample group of growers in two important farm sizes (those with acreages centering on 1,100 and 2,800 acres) furnished this information in individual interviews.

We also needed price and cost information in order to determine the fixed and variable costs, gross receipts, and net earnings for the several crops and the entire farm operation for each of our four analysis models. Both dealers serving agriculture and various official price assembling agencies provided this information. Certain items in this category, of course, came directly from farmers during the interviews. In addition, the analysis utilized every possible means of checking information from the various sources in order to assure that the final farm models provide a fair representation of actual farm organization practices and earnings under these conditions in the area.

The farm budget analysis technique proved effective in analyzing farm adjustments and earnings on the Westside under cotton acreage allotments. Once we had determined the farm characteristics, including cropping systems before and after allotments, the budget analysis required the following steps:

1. Preparing input tables for each crop, including farm practices, time requirements and materials, and determining dollar costs for inputs.
2. Determining gross receipts according to yields and prices for each crop.
3. Calculating the differences between gross receipts and costs for each crop in order to determine net earnings.

4. Summarizing all the individual crop information into the total farm and determining total farm profits.

We used the budget analysis technique to find out the earnings performance for each of the farm models both before and after acreage allotment programs. It was necessary, in order to obtain a true earnings or profit figure, to consider overhead or fixed costs. This required us to analyze both noncash costs, such as depreciation, and cash fixed costs, such as taxes and insurance. Once we had completed the budget analysis for our four farm models, we had information indicating the "typical" impact of 1954-1955 cotton acreage allotments on Westside cotton growers operating such farms as we studied. Our findings may not fit precisely any particular farm of the same size as one of the four models. The information should be highly useful, however, for indicating the general over-all effects of the allotment programs on 1,100 and 2,800 acre operating units.

SOILS AND CLIMATE FAVOR HIGH COTTON YIELDS ON THE WESTSIDE

Over Half the Soil is Recent Alluvium

A recent soil survey report provides up-to-date information on soil resources in Western Fresno County. [1] This report, of course, does not provide complete information for the Westside subarea as defined above. The importance of Western Fresno County in the Westside, however, is such as to make this report extremely valuable. Panoche is the most important series in Western Fresno County, representing over half of the total soil area. About 3/4 of this almost 500,000 acre total is classed as Storie Index grade 1, with most of the remainder as grade 2 (Table 2). Grade 1 soils, including Panhill, Columbia and Sorrento,totaled forty-six percent of all soils in survey area; another 15 percent, again with Panoche representing 3/4, classed as grade 2. These highly productive soils are all recent alluvium and occur as generally smooth valley land. Thus the topography favors leveling and other developments for intensive agriculture when water is available at economic prices. The lower rating soils on the Westside include basin and upland (Table 2). Alkaline conditions usually occur in these older basin soils, and the uplands often have broken topography. [2]

The Panoche is a highly important cotton soil. Not only does it represent a large number of acres, but it produces extremely high yields. Three or more bales per acre are not uncommon on efficient operations (a bale of cotton weighs 500 pounds gross, including 478 pounds of lint and 22 pounds bagging and ties). One reason that the Panoche series is outstanding for producing cotton is its excellent response to fertilizer. A recent study indicated that

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[1] Harradine, Frank F., Soils of Western Fresno County, California, University of California, Berkeley, California, August, 1950.

[2] Storie, R. Earl, An Index for Rating the Agricultural Value of Soils, University of California Bulletin 556, September, 1933, and June, 1937 (Rev.).

TABLE 2

Soils by Grades; Western Fresno County

Grade	Series	Acres	Percentages of	
			grade	total
	1	2	3	4
I	Panoche	387,900	92.7	43.0
	Panhill	26,650	6.4	3.0
	Columbia	3,600	.9	.4
	Sorrento	75	.0[a]	.0[a]
	Subtotal	418,225	100.0	46.4
II	Panoche	108,400	82.0	12.0
	Lost Hills	13,400	10.1	1.5
	Panhill	4,000	3.0	.4
	Temple	3,600	2.7	.4
	Ortigalita	1,300	1.0	.1
	Sorrento	900	.7	.1
	Columbia	600	.5	.1
	Subtotal	132,200	100.0	14.6
III	Oxalis	56,500	51.4	6.3
	Kettleman	15,750	14.3	1.7
	Temple	12,800	11.6	1.4
	Lost Hills	7,600	6.9	.8
	Lethent	5,400	4.9	.6
	Panoche	5,100	4.6	.6
	Merced	2,700	2.5	.3
	Ortigalita	2,500	2.3	.3
	Los Banos	1,600	1.5	.2
	Subtotal	109,950	100.0	12.2
IV	Kettleman	39,900	33.4	4.4
	Merced	34,050	28.5	3.8
	Oxalis	33,500	28.1	3.7
	Other	11,900	10.0	1.3
	Subtotal	119,350	100.0	13.2
V	All series	122,675	100.0	13.6
	Total land	902,400		100.0

[a] Less than .1 percent.

farmers commonly stopped short of the amount of fertilizer that it would be profitable to supply in producing cotton on this soil. 1/

Moisture is the Limiting Factor; Other Climatic Characteristics Favor Cotton Production

The climate in the Westside subarea is hot and arid. Thus, climatic data for Coalinga show an all-time high of 112° F. with July average temperatures at 82½° F. for 45 years of record (Table 3). The average annual precipitation at this station is 6.93 inches of rainfall. These temperatures are highly favorable for proper growth and development of the cotton plant; the moisture is decidedly inadequate, particularly since practically all comes between October and April. Available information indicates that weather conditions throughout the Westside are quite similar to those in Fresno and more southerly points in the eastern portion of the San Joaquin Valley (Figure 2). But there is less rainfall on the Westside, and the growing season at Coalinga is shorter than at Fresno. These similarities, even in the absence of detailed information over extended periods for the portions of the Westside lying north and south of Coalinga, leave little doubt that the Westside temperature and growing seasons are favorable for cotton. Inadequate irrigation water supplies represent the dominant problem in producing cotton (and other summer crops) in the Westside. Irrigation is essential for all summer crops, and necessary to produce practically all winter crops profitably. Growers in this subarea obtain practically all the irrigation water supplies from underground sources, using wells and pumps to raise the water to the surface; the relatively small quantity of Delta-Mendota canal water available in the northern portion of the Westside represents a small fraction of total water requirements, and this source is not generally available to Westside growers.

1/ McCorkle, Chester O., Jr. and D. S. Mikkelsen, "Nitrogen More Than Pays its Way on California Cotton," National Fertilizer Review, Vol. 29, No. 1, January-March, 1954, pp. 17-19.

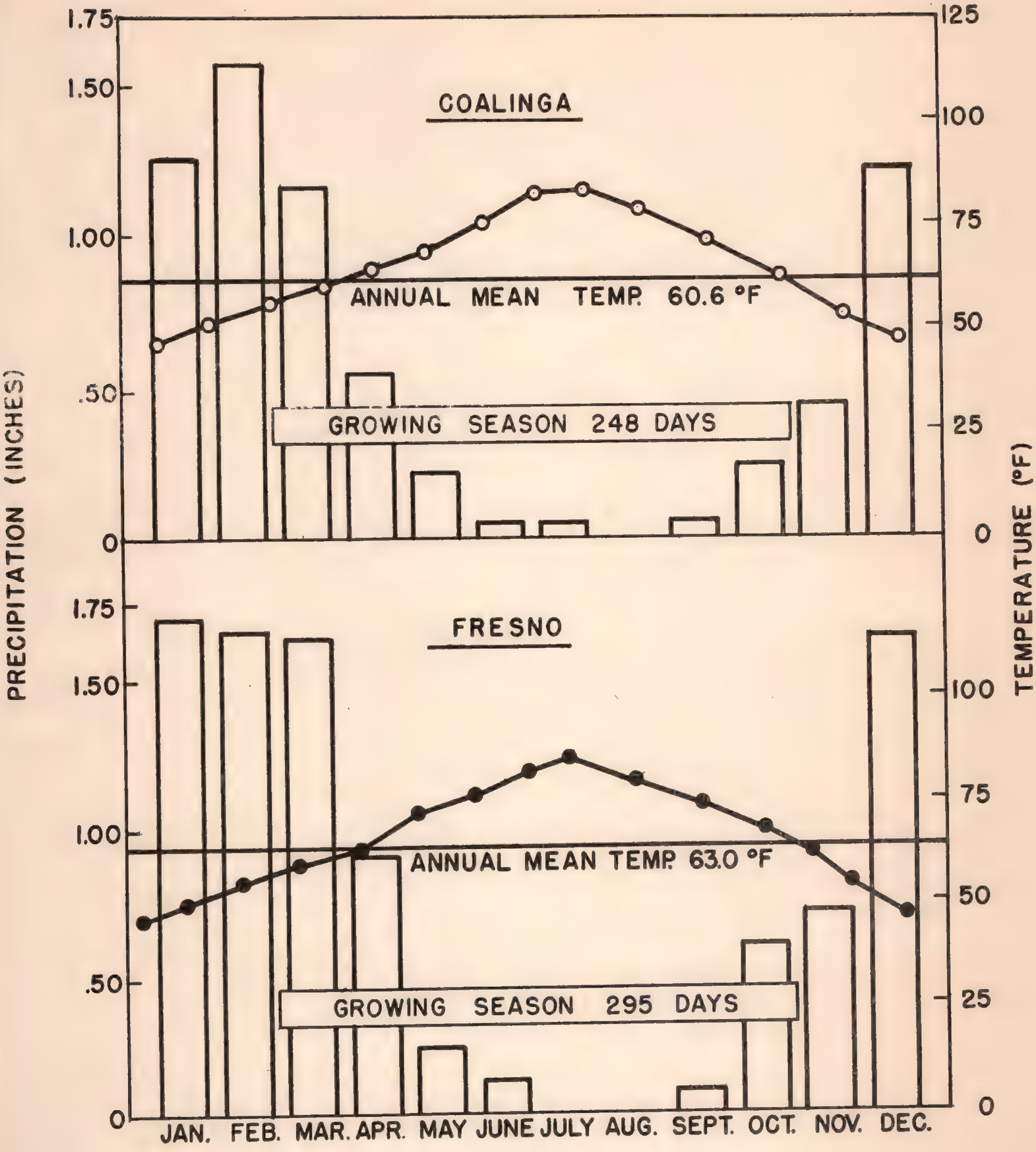
TABLE 3

Climatic Summary: Coalinga and Fresno, California

	Coalinga		Fresno	
	years	item	years	item
	1	2	3	4
Temperature				
January average	45	45.7° F	40	45.5° F
July average	45	82.5° F	40	81.3° F
Maximum recorded	12	112.0° F	40	115.0° F
Minimum recorded	17	26.0° F	40	17.0° F
Growing season				
Average date of last killing frost	9	Mar. 21	36	Feb. 9
Average date of first killing frost	9	Nov. 24	36	Dec. 1
Average length of growing season	9	248 days	36	295 days
Precipitation				
Mean annual	46	6.93 in.	40	9.43 in.

Source: Climatological Data, U. S. Weather Bureau Annual Summary 1957, and Harradine, Frank F., Soils of Western Fresno County, California, University of California, 1950.

Figure 2. Precipitation, Temperatures and Growing Seasons; Coalinga and Fresno



Sources: Climatological Data, U. S. Weather Bureau;
Precipitation – Coalinga 46, Fresno 80 years
Temperatures – Coalinga 45, Fresno 70 years

The Westside water problem focuses on the limited supplies and high costs. Total pumpings in 1952-53 were 1,240,000 acre feet. [1/] Some of this water percolated back to restore ground-water supplies, but the net overdraft in that year is estimated at about 500,000 acre feet. Subsequent increases in pumping probably have raised this net annual overdraft figure to about 750,000 acre feet per year. These data indicate clearly that agriculture on the Westside will be of limited duration unless replacement water is obtained. The estimated recharge from natural sources, 230,000 acre feet per year in 1951, is less than 1/3 of the overdraft alone. Thus, the ultimate solution to the Westside water problem is to obtain additional water from new sources. If farmers are unable to accomplish this, costs will force them to abandon present farming methods, based on using large amounts of water to produce summer crops. But Westside growers have current problems. One of these is the depth to water supplies, and consequent long lifts to get this water to the surface. The estimated over-all lift in the Mendota-Huron area in 1951 was 400 feet. But with continuous pumping, the water level has dropped further; it is likely that the lift now averages about 500 feet. This means high cost per acre foot for irrigation water. Our analysis in this study indicates that irrigation water costs for most Westside cotton acreage are in the range of $20.00 per acre foot or more.

The seriousness of the water problem has dominated Westside agriculture from its very beginning. One reason for the high pumping lift has been that the available water supplies furnishing 30 percent or more of irrigation water lie from 500 feet to 2,000 feet below the surface. The 400 foot lifts required powerful and expensive pumping plants, and consequent high water costs, even 8 to 10 years ago. Farmers consequently developed an agricultural pattern on

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[1/] Davis, G. H., J. P. Poland, et.al., Ground-Water Conditions in the Mendota-Huron Area, Fresno and Kings Counties, California, U. S. Geological Survey, Sacramento, California, June, 1954.

the Westside based on approximately one well per 640-acre section with a pumping capacity of 1,000 gallons per minute or more. Under ideal conditions a grower could expect with one such well, representing an initial investment of $25,000 or more, to provide adequate water for about a quarter section (160 acres) in summer crops, and the remaining three quarters of his land in barley, produced during the winter months. He expected to operate his well most of the year--9 to 10 months--and thereby to obtain maximum use from this facility. A further reason for the long pumping seasons is that in much of the Westside ground-water supplies have relatively high mineral content. The consequent corrosive effect of this mineral tends to shorten the life of the pumps. Growers report that they consider 10 years of pump life acceptable under such conditions.

Westside farmers have commonly fallowed important amounts of land. They may pump water on this land in preparation for a winter crop at any time that the summer crop, usually cotton, does not require it. This is one of the reasons for the relatively high annual return of pumped water to underground sources.

Specific and Expensive Pest Control Programs Against Insects, Diseases and Weeds are Required

The Westside, like other California cotton producing areas, is subject to destructive pest attacks. Cotton growers in the subarea protect themselves against losses from insects, diseases, and weeds by effective control programs. These, of course, require outlays for material and application. Air application is common for both pest control and defoliation; contract flying services are available to provide air application on a custom basis. Some of the more important insects that harm cotton include: cotton aphis, Lygus bugs, Atlantic and other mites, and boll worm (corn earworm). Control measures include dusts and sprays, applied by ground or air equipment as pest incidence

dictates, or according to schedule. Rootknot nematode is serious in some localities; growers control this pest, primarily, by rotation and summer fallow. Various diseases may give trouble: verticillium wilt, soreshin, (rhizoctonia), and bacterial blight are examples. Resistant strains and rotation are the most effective disease controls.

The above-mentioned common practice of alternating summer and winter crops and fallowing in the Westside tends to minimize control problems for irrigated crop weeds. Growers using surface irrigation water, of course, have the usual difficulties with water-borne seeds.

Economic Factors Dominated Adjustment Decisions on the Westside

Most California cotton growers, confronted by cotton acreage allotments in 1954, had certain adjustment choices. They could concentrate on short-run adjustments, begin long-run shifts in farm organization and resource use, or make some changes of both kinds. Westside growers found themselves in a more difficult position when making cotton allotment adjustments than most California cotton growers. Water availability and cost, both present and future, were basic elements in both types of adjustments. Growers in this subarea enjoyed very limited choices as they sought crops to replace cotton. High cotton prices and returns largely explained much new land development in the Westside after World War II. The enforced acreage cut left growers in this subarea with no equally profitable alternative crop to replace cotton on diverted acres. Most growers had difficulty in choosing a crop promising any profit! They knew that other summer crops typically require as much or more water than cotton, but fail to return equivalent receipts to cover its costs. Long-term adjustments, on the other hand, come under serious shadow due to the certainty that water supplies will reduce further, costs will increase, and profitable crop production will become increasingly difficult - unless new sources of low cost water become available. The long-term situation is

further clouded for many Westside operators because of the large amounts of capital required to make farm improvements involved in such adjustments. We already indicated that a single irrigation well represents an initial investment of $25,000 or more; comparable costs attach to water distribution systems, and other long-term investments appropriate to the farm sizes on the Westside. An additional factor for many operators is that they do not own all of the land they operate; much of the area is not for sale, and, therefore, is operated on a rental basis. All of these unique uncertainties, added on to the usual ones confronting long-term managerial decisions, practically eliminated long-term adjustments on the Westside. These growers, therefore, concentrated for the most part on short-term adjustments to the acreage allotment program beginning in 1954. Their possibilities here included:

(1) Changing acreages in crops already grown and adding new crops.

(2) Changing the kind and quantity of variable inputs such as fertilizer, irrigation water, and labor.

(3) Varying the rate of using services from presently opened capital goods such as tractors, harvesting machines, and the land.

(4) Modifying the timing for critical production practices and operations.

(5) Shifting the form, time, place or outlet for selling specific products.

This means that Westside growers, in general, preferred not to make long-run shifts requiring heavy outlays in new capital investment. This was particularly true of investments attached to the land. Many growers in their search for new crops found it necessary to invest some capital in new capital goods in order to provide the services needed for such production.

Thus, specific short-run adjustments on the Westside related closely to land use and, above all, to increasing cotton efficiency. The actual changes can be grouped as follows:

(1) Reducing cotton acres as required by allotments.

(2) Allocating the diverted acres to other crops or uses if such appeared to be profitable or even to offer the possibility of leaving an excess over variable expenses to carry the total farm burden of fixed cost.

(3) Changing the technology and imputs for growing cotton to increase yields and profits.

(4) Changing the land use rates and land management practices.

(5) Attempting to improve prices for crops other than cotton by changes in production practices and sales policy.

Westside growers, like other California cotton producers, made little use of the Acreage Reserve phase of the Soil Bank. Cotton is their most profitable crop, and enjoys an extremely wide earnings margin over the next best alternative on most farms. Westside growers had only indifferent success in finding profit-earning crops to absorb the acres diverted from cotton.

Both Human and Institutional Factors are Important on the Westside

We indicated above that Westside growers operate considerable amounts of rented land. One reason for this is large holdings by Southern Pacific Railway Company, Standard Oil Company, and other corporations. These firms are not primarily concerned with the land as agricultural producers. They hold it for other uses, and follow policies designed to make the land pay its costs and return a profit, where possible. These corporation policies do not provide for adding capital investment to make land improvements.

The grower meets this situation with the development lease. Such an agreement extending at least five, and usually for ten or more years, provides that the renter shall level lands, install wells, and otherwise put the land in productive condition. The landlord, in exchange, accepts a specific rental reduction. Growers whom acreage allotments found with such agreements, are

under considerable financial pressure. They must accomplish all possible short-run shifts that will help them obtain the earnings they expected when they signed their leases and invested their capital. Growers making new leases after the acreage allotment program is established can, of course, make their plans and the accompanying agreements consistent with allotment conditions.

The price support, acreage allotments, and other components of national farm policies themselves represent an important institutional factor. The uncertainty element, furthermore, is quite dominant in the farm policy area. Thus, the Soil Bank with its Conservation and Acreage Reserve provisions came later, and may modify acreage allotments for the individual grower. Current information indicates that the acreage reserve phase of this program may be modified sharply or eliminated after 1958. Further, the 85th Congress passed and the President signed new farm legislation. This alters sharply both price support and production control status. Growers, therefore, must recognize that they assume a considerable hazard when they make long-term plans involving heavy investments in accordance with existing knowledge of such forces as national farm policy.

Even if we ignore the likelihood of change, and the consequent uncertainty, farmers find themselves greatly limited in freedom to make decisions by existing program provisions. Thus, cotton is not the only crop subject to acreage restriction. In California, sugar beets, rice, and wheat also are under production control. The farmer seeking a use for diverted cotton acres has very little opportunity to expand these other controlled crops.

The farmer's own personality, experience, and interests may limit him seriously as he attempts to adjust to the acreage allotment program. We already have pointed out that no one or few crops can absorb profitably the land diverted from cotton. There are a number of specialty crops that, under favorable price and market conditions, can pay profits on small amounts of the land removed from cotton. Each of these is capable of absorbing only a limited

acreage. Also, many of these alternative crops require special aptitude and knowledge for profitable operations. Often, in addition, farmers can market them successfully only through unique marketing channels or arrangements. Here, we have both the institutional and the human factor involved. The farmer who does not have the knowledge, aptitude, and experience for one of these crops, and who is not willing to spend effort to obtain them, cannot look to them as alternatives. On the other hand, even if personal factors impose no limitation, it is not possible for any large number of growers representing an important amount of acreage to obtain satisfactory market outlets and prices for any one of these crops. Indeed, a combination of several may offer insufficient demand to absorb a large share of the acres diverted from cotton!

We have indicated above, some of the physical, economic, and man-made problems that cotton growers faced when the Secretary of Agriculture announced cotton acreage allotments in 1954. Let us now examine, specifically, how these allotments affected Westside cotton growers. Answers to the following questions will indicate the impact of cotton acreage allotment on farm cropland organization:

(1) What are the sizes of farming units and what are the relative numbers of farms in each size?

(2) How is the total farmland divided among these various farm sizes?

(3) What crops were Westside farmers growing before allotments and how did they allocate their lands above these crops?

(4) How did they change this cropping pattern after allotments?

We were able to obtain a great deal of information on land use adjustments under the allotments. We have summarized and classified this information, for the Westside area as a whole, in order to determine how allotments affected cotton, other crops, and fallow lands. Forces other than allotments were operating at the same time, of course; some of the changes that our analysis

reveals undoubtedly reflect these other factors. We did not attempt, however, to measure precisely the amount of each identifiable change due to each separate factor. The available information points clearly to the conclusion that cotton acreage allotments were a major force governing changes between 1953 and 1955. We, therefore, undertook to study the mechanics of acreage allotments in detail and to measure accurately the shifts in farm organization, land use, and crop production in these years.

WESTSIDE GROWERS RECEIVED SHARP ACREAGE CUTS UNDER COTTON ALLOTMENTS

Large Farming Units Dominate Westside Agriculture; Small Farms are Unusual

Our data confirm the general belief that cotton growing in the western San Joaquin Valley is based on large scale farming operations. Thus, the aggregate Agricultural Stabilization and Conservation Committee data for western Fresno County in 1954 showed 145 allotment holders. These growers accounted for over 300,000 acres of cropland, of which about equal amounts--nearly 40 percent--occurred in each of two sizes, farms of 2,001-5,000 and of 5,001-10,000 acres. A total of 55 growers thus accounted for almost 80 percent of the cropland. We combined with western Fresno County data comparable information for the western portions of Merced, Kings, and Kern counties to obtain an over-all view of land use and cotton production in the San Joaquin Valley Westside (Tables 4-6). We found that 304 allotment holders had 1.25 million acres of cropland of which nearly 400,000 were in cotton during the years 1951-1953 (Table 4). There are very few small operators in the Westside. Only 41 allotment holders, or 14 percent of the total, reported farms of 660 acres or less in 1954. These growers were responsible for 1 percent of the total cropland and 2 percent of the cotton. At the other extreme, according to size, 15 percent of the growers reported 62 percent of all land and 53 percent of the cotton (Table 4). The latter group includes farms of 10,001 acres and over, in addition to the 5,001-10,000 acre size mentioned above for western Fresno County. About two-thirds of the growers (197) reported about one-third of the cropland and 43 percent of the cotton in 1954. This group included two farm sizes, those ranging from 1,001-2,000 and from 2,001-5,000 acres. The

TABLE 4

Farm Size, Total Cotton Acres, and Acres Diverted, 1954 and 1955: San Joaquin Valley Westside

Cropland class intervals	Number of farms	Cropland		Total cotton acres				Diverted acres	
		average per farm	total	3-year average 1951-1953	1953	final allotment 1954	acres planted 1955 a/	3-year average to 1954	3-year average to 1955
	1	2	3	4	5	6	7	8	9
		acres							
1 - 420	24	196.3	4,711	2,115	2,134	1,620	1,283	- 495	- 832
421 - 660	17	574.4	9,764	4,596	5,095	3,033	2,417	- 1,563	- 2,179
661 - 1,100	21	922.2	19,366	6,790	6,414	4,492	3,593	- 2,298	- 3,197
1,101 - 2,000	105	1,427.1	149,842	67,800	67,089	45,180	36,079	- 22,620	- 31,721
2,001 - 5,000	92	3,192.0	293,663	106,291	110,170	72,812	58,128	- 33,479	- 48,163
5,001 + over	45	17,238.9	775,752	210,309	212,082	140,744	112,364	- 69,565	- 97,945
Total	304	4,122.0	1,253,098	397,901	402,984	267,881	213,864	-130,020	-184,037

a/ Estimated.

Source: California Agricultural Stabilization and Conservation Committee--includes Western Fresno County and portions of Kern, Kings, and Merced counties.

TABLE 5

Cotton Acreage in 1953, 1954, and 1955: San Joaquin Valley Westside

Cropland class intervals	Average acres per farm	Number of farms	1953		1954		1955		Changes in acreage	
			total	average	total	average	total	average	1953 to 1954	1954 to 1955
	1	2	3	4	5	6	7	8	9	10
	acres		acres							
1 - 420	226.3	3	535	178.3	383	127.7	325	108.3	- 152	- 58
421 - 1,100	709.1	8	2,930	366.2	1,871	233.9	1,588	198.5	- 1,059	- 283
1,101 - 5,000	2,378.2	73	82,083	1,124.4	53,451	732.2	45,371	621.5	-28,632	- 8,080
5,001 + over	18,897.0	18	100,256	5,569.8	67,750	3,763.9	57,509	3,194.9	-32,506	-10,241
Total	5,099.1	102	185,804	1,821.6	123,455	1,210.3	104,793	1,027.4	-62,349	-18,662

Source: Questionnaire returns, 1954.

TABLE 6

Crops Other Than Cotton in 1953 and 1954: San Joaquin Valley Westside

Cropland class interval	Average acres per farm	Number farms	Alfalfa			Irrigated pasture			Barley		
			farms reporting	acres		farms reporting	acres		farms reporting	acres	
				total	average		total	average		total	average
	1	2	3	4	5	6	7	8	9	10	11
1953											
1 - 420	226.3	3	2	136	68.0						
421 - 1,100	709.1	8				2	9	4.5	6	1,840	306.7
1,101 - 5,000	2,378.2	73	26	6,658	256.1	15	3,397	226.5	45	43,370	963.8
5,001 & over	18,897.0	18	5	14,580	2916.0	3	10,326	3442.0	16	101,993	6374.6
Total	5,099.1	102	33	21,374	647.7	20	13,732	686.6	67	147,203	2197.1
1954											
1 - 420	302.0	3	2	383	191.5	1	43	43.0	2	155	77.5
421 - 1,000	722.5	8				2	9	4.5	7	1,975	282.1
1,001 - 5,000	2,309.0	73	28	8,916	318.4	18	3,944	219.1	59	59,195	1003.3
5,001 & over	18,905.8	18	6	14,996	2499.3	4	6,177	1544.2	17	109,105	6417.9
Total	5,054.4	102	36	24,295	674.9	25	10,173	406.9	85	170,430	2005.1

Cropland class interval	Milo			Field corn			Other crops			Fallow		
	farms reporting	acres		farms reporting	acres		farms reporting	acres		farms reporting	acres	
		total	per farm		total	per farm		total	average		total	average
	12	13	14	15	16	17	18	19	20	21	22	23
1953												
1 - 420							1	8	8.0			
421 - 1,100							2	190	95.0	6	704	117.3
1,101 - 5,000	4	226	56.5	1	20	20.0	26	17,173	660.5	41	20,995	512.1
5,001 & over	1	610	610.0	1	44	44.0	10	40,112	4011.2	15	70,909	4727.3
Total	5	836	167.2	2	64	32.0	39	57,483	1473.9	62	94,239	1520.0
1954												
1 - 420							1	40	40.0	3	135	45.0
421 - 1,100	2	75	37.5				3	467	155.7	6	1,383	230.5
1,101 - 5,000	20	3,821	191.0	13	2244	172.6	30	18,591	619.7	47	27,024	575.0
5,001 & over	6	14,142	2357.0	3	5076	1692.0	13	27,595	2122.7	17	95,395	5611.5
Total	28	18,038	644.2	16	7320	457.5	47	46,693	993.5	73	123,937	1697.8

Source: Questionnaire returns, 1954.

following text table summarizes this information in brief form:

Cropland class intervals	Allotment holders	Cropland acres	Cotton acres
acres		(percent of total)	(percent of total)
1 - 660	14	2	2
661 - 1,100	7	2	2
1,101 - 2,000	34	12	17
2,001 - 5,000	30	23	26
5,001 + over	15	61	53

Westside growers planted almost 186,000 acres of cotton in 1953 (Table 5). The acreage allotment program brought an 81,000 acre reduction between that year and 1955, with 62,000 removed in 1954 and an additional 19,000 in 1955. Thus the acreage control policy was highly effective in cutting plantings in the San Joaquin Valley Westside. The average cotton acreage for Westside farms in the smallest size range was 178 acres in 1953, a level approaching the maximum season's capacity for a one-row spindle type mechanical cotton harvester. 1/

The 1953 acreage for the next farm size was approximately double that of the 1-420 acre farms, or equal to the capacity of two mechanical harvesters. The third farm size (1,101-5,000 acres) had 11,024 acres of cotton in 1953 or approximately three times that of the 421-1,100 acre farm. Operators of the largest units averaged 5,600 acres of cotton per farm, but this figure is not nearly as reliable to indicate typical operations for the farm size group as the averages cited for the three smaller sized operations. This is because of the wide range in actual farm acreages included in the 5,001-and-over size group. It is important to note, however, that the effects of acreage allotments

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1/ Hedges, Trimble R. and Warren R. Bailey, Economics of Mechanical Cotton Harvesting, Calif. Agr. Exp. Sta. Bulletin 743, University of California, April, 1954.

on the two small farm sizes was to reduce cotton acreage to the point that farms in the smallest size could use effectively only about one-half of the season's capacity for a harvester. Farms in the next largest farm size needed only one picker instead of two.

The specific crop shifts that individual operators made in their attempts to find a use for diverted cotton acres varied widely among farm sizes (Table 6). The larger operations were responsible for most of the increase in milo and field corn acreage from 1953-54. A decrease in cotton acreage of 62,300 acres between 1953-54 was accompanied by increases as follows: barley - 23,200 acres, fallow - 29,700 acres, and milo and field corn combined - 24,460 acres (Table 7). Reductions occurred in acres of alfalfa and irrigated pasture and "other crops."

TABLE 7

Total Land Use Changes by Crops;
San Joaquin Valley Westside, 1953-1954

Crop	1953 1	1954 2	Changes 3
	acres		
Cotton	185,804	123,455	-62,349
Barley	147,203	170,430	23,227
Fallow	94,239	123,937	29,698
Alfalfa & irrigated pasture	35,106	34,468	- 638
Milo & field corn	900	25,358	24,458
Other crops	57,483	46,693	-10,790
Total	520,735	524,341	3,606

Source: Calculated from Agricultural Stabilization and Conservation Committee data.

The Analysis Models Represent Intermediate Sized Farms on the Westside

We selected two farm sizes for detailed analysis in the Westside subarea. These sizes,as previously indicated, include farms of 1,100 and 2,800 acres of cropland, respectively. We found it necessary to consider three different cropping organizations for the latter size, in order to represent the various adjustments that farm operators made after acreage allotments. The models as developed indicate reasonably well farming conditions and adjustments on approximately half of the farms in western Fresno County with grades 1 and 2 soils and under 1953-1955 conditions. We discovered that most of the operations smaller than 1,100 acres in this subarea were abnormal in one or more respects. Typically, the farm was located on lower quality soil, or had unusual water difficulties. We excluded, at the other extreme, the largest operations, even though they include most of the cropland and the cotton acreage. Approximately 75 of the 145 allotment holders in western Fresno County during 1954 made up the group from which we drew our sample data in developing our farm models. We deliberately excluded the largest operations for two reasons: (a) Each one tends to have certain distinctive characteristics thus making it difficult to arrive at a generally representative or typical model, and (b) The greater numbers in the smaller size groups we include in our analysis widens the range of usefulness of the results, in terms of number of operators.

Our four models will provide the land use and cropping system framework for analyzing the impact of acreage allotments on Westside cotton growers. The data for the 1,100 acre model indicate that farmers operating such units reduced cotton acreage by 180 acres and fallow by 50 acres, while increasing barley by 100 and alfalfa seed by 150 acres after allotments. Alfalfa seed was a new crop on these farms.

The 2,800 acre models include 2,800-1 (Farm 1), 2,800-2 (Farm 2), and 2,800-3 (Farm 3) (Table 8). The 2,800-2 farm added sugar beets in 1955; we

TABLE 8

Crops and Land Use on Farm Models, 1953-1955

1,100-acre Farm:

Land use	1953	1954	1955
	1	2	3
	acres		
Cotton	360	240	200
Barley	450	450	550
Milo	40	40	
Alfalfa seed		120	150
Idle or fallow	200	200	150
Total cropland	1,050	1,050	1,050
Noncultivated	50	50	50
Total land	1,100	1,100	1,100

2,800-acre Farms:

2,800-1 (Farm 1)

Land use	1953	1954	1955
	1	2	3
	acres		
Cotton	800	525	440
Barley	1,250	1,300	1,560
Idle or fallow	650	875	700
Total cropland	2,700	2,700	2,700
Noncultivated	100	100	100
Total land	2,800	2,800	2,800

2,800-2 (Farm 2)

Land use	1953	1954	1955
	1	2	3
	acres		
Cotton	800	525	440
Barley	1,250	1,300	1,460
Sugar beets			200
Idle or fallow	650	875	600
Total cropland	2,700	2,700	2,700
Noncultivated	100	100	100
Total land	2,800	2,800	2,800

2,800-3 (Farm 3)

Land use	1953	1954	1955
	1	2	3
	acres		
Cotton	800	525	440
Barley	350	400	810
Melons	900	900	750
Idle or fallow	650	875	700
Total cropland	2,700	2,700	2,700
Noncultivated	100	100	100
Total land	2,800	2,800	2,800

will refer to it as a cotton-barley-sugar beet farm. Cotton, barley, and melons made up the cropping system on the 2,800-3 farm, except for fallow lands. It will be convenient at times to identify it as a cotton-barley-melon farm. The acreage data for these four models indicate that only two, the 1,100 acre with alfalfa seed and the 2,800-2 with sugar beets, introduced new crops after cotton acreage allotments. Operators on the other models limited their shifts to making adjustments in crops already included in the cropping system, or in changing acres fallowed.

ADJUSTMENTS FOLLOWING COTTON ALLOTMENTS REQUIRED CHANGES IN PRODUCTION PRACTICES AND INPUTS

Changes in Variable Factors Affected Farm Earnings

Farm earnings change after allotments as the result of variations in (1) the cropping plan, (2) quantity of inputs, (3) quality of inputs, (4) costs of inputs, (5) yields, and (6) prices received. For example, the yield of cotton increased between 1953 and 1955 partly because producers used larger amounts of irrigation water and fertilizer. Better management practices were followed. Farm operators made every effort to plant their cotton allotments on the better soils; they rotated their crops more effectively to lessen the occasions when cotton followed cotton, and they improved their cultural practices. New crops, or expanded acreages of existing crops, entered the farm production program as soon as cotton allotments went into effect. It was in this direction that adjustments occurred, as well as through more intensive inputs to cotton, which affected the cost of producing cotton.

In addition to changes in yields and in the costs of production caused by changes in variable inputs, prices also changed sufficiently to have a pronounced effect on net income. On the other hand, some cost items, such as labor and seed, remained fairly constant. The change in net farm income between 1953 and 1955 was due primarily to more intensive cultural practices, yield differences, and price changes.

1,100-ACRE FARM: HIGHER COTTON YIELDS AND PRICES IN 1955 OFFSET ABOUT HALF OF THE DROP IN EARNINGS DUE TO ALLOTMENTS

Changes in Organization and Investment were Minor

The 1,100-acre farm had the following investments, excluding land:

Item	Investment 1/ (1955 prices)	Percent of total investment
Power 2/	$21,384	24
Equipment 3/	18,890	22
Irrigation system	33,088	38
Improvements	14,183	16
Total	$87,545	100
Per acre	80	

This farm had a greater number of tractors and trucks than did the smaller cotton farms in the San Joaquin Valley. 4/ The sizes of power items and equipment were also considerably larger. Investment costs are, thereby, commensurately greater. Factors which affect the selection of power and equipment are the rate of performance, the competitive timing of need for similar types of equipment, and the relationship of the cost of ownership compared to custom rates.

1/ New replacement costs for these capital items, excluding land, were $164,217 at 1955 prices (Table 9).

2/ Consists of tractors and trucks - includes $1,820 investment in one W-1 tractor not used in either 1953 or 1955.

3/ Includes $1,820 investment in equipment not used in 1953 or 1955. This figure also includes $532.50 investment in two items, a 10-foot disk and a 12-foot springtooth harrow, which the operator purchased in 1955 for use in producing an alternative crop, alfalfa seed.

4/ See: Hedges, Trimble R., Farm Adjustments and Earnings under 1955 Cotton Acreage Allotments. 1. Upper San Joaquin Valley Cotton Farms, 1953-55, Calif. Agr. Exp. Sta., Giannini Foundation of Agricultural Economics, Mimeo. Report No. 191, December, 1956. Caton, Douglas D., Trimble R. Hedges, and W. Neill Schaller, Farm Adjustments and Earnings under 1955 Cotton Acreage Allotments. 3. Eastside San Joaquin Valley Cotton Farms, 1953-1955, Calif. Agr. Exp. Sta., Giannini Foundation of Agricultural Economics, Mimeo. Report No. 202, May, 1958. Caton, Douglas D., Trimble R. Hedges, and W. Neill Schaller, Farm Adjustments and Earnings under 1955 Cotton Acreage Allotments. 4. Central San Joaquin Valley Cotton Farms, 1953-1955, Calif. Agr. Exp. Sta., Giannini Foundation of Agricultural Economics, Mimeo. Report No. 208, July, 1958.

Some equipment items are extremely expensive to own, such as a landplane or a mechanical cotton harvester. The two one-row cotton pickers on this farm accounted for $10,440, or 55 percent of the total equipment investment. The tractors and trucks accounted for average investments of $21,384 with an estimated new cost of $36,425.

Interviews with operators indicated that, commonly, a few power and equipment items on Westside cotton farms are not used every year (Table 9). Technological changes in farm equipment account for the existence of some idle, but operable equipment. In these cases, improved equipment is substituted, but the operator elects to retain the replaced items rather than trade them. Idle power and equipment serve a "standby" function, i.e., as a hedge against crop loss resulting from the untimely failure of items currently in use or from the inability of the operator to make contract arrangements. In some cases, actual use in the near future is anticipated.

The investment in equipment would have been greater than it was if a number of operations had not been contracted. Contract services used in producing cotton included fertilizing, thinning, weeding, dusting, and defoliating. The operator also used contract arrangements extensively in the production of milo, barley, and alfalfa seed. One piece of equipment, a landplane, was rented.

The irrigation system on this farm consisted of two wells, each with a 1,400 g.p.m. capacity. Irrigation water was distributed by underground pipe. The required investment was $33,088 at 1955 prices.

The labor force consisted of hired labor; no family labor was used. The hired labor included: (1) one foreman, (2) one strawboss, (3) one shop mechanic, (4) a part-time bookkeeper, and (5) field and irrigator labor as required.

Per acre inputs for producing cotton and barley in 1955 were the same as those in 1953 with these exceptions: (1) the operator increased the per acre

TABLE 9

Physical Resources and Investments for Typical 1,100-acre Farm, 1955 Prices

Item	Size or capacity	Amount	New cost		Average investment a/	
			per unit	total	per unit	total
	1	2	3	4	5	6
			dollars			
Land:						
Total	1,100 acres					
Total cultivated	1,050 acres					
Improvements:						
Tenant houses	2-bedroom	2	3,000.00	6,000.00	1,500.00	3,000.00
Labor cabins		10	500.00	5,000.00	250.00	2,500.00
Shop storage b/		1		5,000.00		2,500.00
Tractor, equipment shed		1		2,000.00		1,000.00
Grain storage	1,000 tons			10,000.00		5,000.00
Fuel storage - gas	550 gallons	1		135.00		67.50
Fuel storage - diesel	1,000 gallons	1		231.00		115.50
Subtotal				28,366.00		14,183.00
Irrigation system:						
Pumping plant	150 h.p.; 1,400 g.p.m.	2	13,000.00	26,000.00	6,662.50	13,325.00
Well, casing	16" diameter; 350' lift	2x1,400'	10.00	28,000.00	5.00	14,000.00
Pipe	12"	10,560'	.80	8,448.00	.40	4,224.00
Stands	8' - 36"	4	72.00	288.00	36.00	144.00
Vents	8' - 8"	6	5.60	33.60	2.80	16.80
Line gates	12"	6	51.00	306.00	25.50	153.00
Alfalfa valves	10"	80	15.00	1,200.00	7.50	600.00
Siphons	3/4" - 2"	1,000	1.25	1,250.00	.63	625.00
Subtotal				65,525.60		33,087.80
Power:						
Tracklayer	T-5D (35-45 h.p.)	1		7,000.00		3,850.00
Tracklayer	T-7D (60-70 h.p.)	1		11,225.00		6,173.75
Wheel tractor c/	W-1 (20-25 h.p.)	1		2,600.00		1,820.00
Wheel tractor	W-2 (25-35 h.p.)	2	3,000.00	6,000.00	2,100.00	4,200.00
Pickup	1/2-ton	2	2,000.00	4,000.00	1,200.00	2,400.00
Truck	1 1/2-ton	2	2,800.00	5,600.00	1,470.00	2,940.00
Subtotal				36,425.00		21,383.75

(Continued on next page.)

Table 9 Continued.

Item	Size or capacity	Amount	New cost per unit	New cost total	Average investment a/ per unit	Average investment a/ total
	1	2	3	4	5	6
			dollars			
Equipment:						
Ditcher	5'	1		140.00		70.00
Scraper	10'	1		520.00		260.00
Plow - disk-plow	6-blade	1		1,750.00		875.00
Chisel	8'	1		525.00		262.50
Disk, offset d/	10'	1		825.00		412.50
Disk, offset	12'	1		1,050.00		525.00
Disk, offset	16'	1		1,450.00		725.00
Border disk		1		175.00		87.50
Spiketooth harrow	5' section	6	50.00	300.00	25.00	150.00
Springtooth harrow d/	12'	1		240.00		120.00
Cultipacker	14'	1		450.00		225.00
Drag or float c/	12' x 20'	1		150.00		75.00
Lister	4-row	1		350.00		175.00
Lister planter	4-row	1		550.00		275.00
Cultivator	4-row	2	1,000.00	2,000.00	500.00	1,000.00
Fertilizer attachment c/	4-row	1		150.00		75.00
Cotton picker	1-row	2	8,700.00	17,400.00	5,220.00	10,440.00
Cotton trailer c/	4-bale	3	350.00	1,050.00	192.50	577.50
Cotton trailer	5-bale	4	400.00	1,600.00	220.00	880.00
Cotton trailer c/	6-bale	3	450.00	1,350.00	247.50	742.50
Stalk cutter	2-row	1		325.00		162.50
Grain drill	14'	1		850.00		425.00
Grain elevator c/		1		350.00		175.00
Grain unloader c/		1		350.00		175.00
Subtotals						
1955				33,900.00		18,890.00
1953				32,835.00		18,357.50
Totals						
1955				164,216.60		87,544.55
1953				163,151.60		87,012.05

a/ $\frac{\text{Original cost + Salvage value}}{2}$ Salvage values are listed in Table 11.

b/ Includes $2,000 worth of tools, equipment, and parts.

c/ Standby equipment owned but not used in 1953 or 1955.

d/ Equipment bought in 1955.

application of irrigation water on his allotted cotton acres and on barley, and (2) he increased the fertilization of cotton.

Production Costs Include Both Fixed and Variable Items

The budget analysis used in this study measures separately, fixed and variable costs. Fixed or overhead costs are as follows:

(1) Depreciation on farm improvements, irrigation facilities, power, equipment, and alfalfa stands.

(2) Interest on average investments in fixed capital.

(3) Taxes on real estate and other farm property.

(4) Insurance on improvements, certain facilities, and equipment.

(5) Office expenses.

(6) Salaries paid to shop labor, supervisory labor, and the part-time bookkeeper.

We included interest as a fixed cost in order to obtain a complete cost picture. However, when measuring returns to capital, management, and labor, we remove interest on investment.

Variable expenses include outlays for:

(1) Electrical energy and fuel.

(2) Repairs and lubrication.

(3) Materials (irrigation water and seed).

(4) Variable labor wages.

(5) Contract services.

(6) Interest on operating capital.

The budget analysis in this report allocates all fixed and variable costs to the crops and to fallow acres, thus permitting comparison between crop earnings in the two years studied. These comparisons provide a measure of the effect of adjustments in cotton acreage allotments on fixed cost allocation among crops. The total per acre costs of producing cotton, for example,

includes: (1) all variable expenses directly incurred by the crop; (2) real estate taxes which apply to the land on which the crop is grown; (3) depreciation, interest, property taxes, and insurance--such costs of owning power, equipment, and irrigation facilities that are charged to the crop according to the use made of these items in production; (4) fixed labor costs which are allocated according to use made of variable labor by the crop; (5) general costs which do not lend themselves to an automatic allocation among producing acres, such as real estate taxes on noncultivated land, office expenses, improvement costs (interest, depreciation, and repairs), and a proportion of the fixed and variable costs of the farm's trucks. Fallow acres on Westside farms required certain cultural inputs, and, therefore, received the same cost treatment as indicated above for producing acres.

The total costs assigned to crops and fallow land are broken down into fixed and variable components. We calculated these costs both on a per acre basis and for the total acreage of the particular enterprise. Under fixed costs, we listed real estate taxes, office, improvements, power, equipment, irrigation water, and labor other than that directly assigned.

For the alfalfa seed enterprise we also included an annual charge for establishing the alfalfa stand as a fixed cost to the alfalfa enterprise. Variable costs include power, equipment, materials, labor, contract items, and interest on operating capital.

The physical inputs and costs of producing each crop on Westside cotton farms are set forth in a statistical supplement to this report. 1/

1/ Caton, Douglas D., Trimble R. Hedges, and W. Neill Schaller, Inputs and Costs for Producing Field Crops. 5. San Joaquin Valley Westside Cotton Farms, 1953-1955, Calif. Agr. Exp. Sta., Giannini Foundation of Agricultural Economics, Mimeo. Report No. 212, September, 1958.

Short-run Crop Adjustments Caused a Redistribution of Fixed Costs But Changed Total Fixed Costs Only Slightly

Real estate taxes, improvements, and office expenses.--Real estate taxes were $5.00 per acre in 1953 and 1955, a farm total of $5,500. We allocated the total tax to crops and fallow acres in accordance with the percentage of total cropland (1,050 acres) occupied by each. [1]

Annual improvement costs on storage facilities, labor housing, and the tractor and equipment shed were as follows:

Depreciation	$1,319.94
Interest on average investment @ 5% .	709.15
Repairs.	560.00
	$2,589.09

This total cost was also charged to crops and to fallow acres on an acreage-ratio basis. [2]

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[1] The tax cost is allocated as follows:

Crop	Acres	Percent of total producing acres	Total tax cost ($)	Per acre tax cost ($)
	1	2	3	4
1953				
Cotton	360	34	1,870	5.19
Barley	450	43	2,365	5.26
Milo	40	4	220	5.50
Fallow	200	19	1,045	5.22
	1,050	100	5,500	
1955				
Cotton	200	19	1,045	5.22
Barley	550	53	2,915	5.30
Alfalfa	150	14	770	5.13
Fallow	150	14	770	5.13
	1,050	100	5,500	

[2] Annual improvements costs were as follows:

Crop	Acres	Percent of total producing acres	Total improvement cost ($)	Per acre improvement cost ($)
	1	2	3	4
1953				
Cotton	360	34	880.29	2.44
Barley	450	43	1,113.31	2.47
Milo	40	4	103.56	2.59
Fallow	200	19	491.93	2.46
	1,050	100	2,589.09	
1955				
Cotton	200	19	491.93	2.46
Barley	550	53	1,372.22	2.50
Alfalfa	150	14	362.47	2.42
Fallow	150	14	362.47	2.42
	1,050	100	2,589.09	

Annual office expenses, other than the bookkeeper's salary, were $450. This amount was allocated in the manner described above.

Power and Equipment.--The fixed cost per acre for power and equipment items depends upon their annual use. We first obtained fixed costs per unit of input (per hour for tractors and equipment, per mile for trucks) by dividing the annual fixed cost of each item by the annual use of the item. Calendars of operations for each crop and for fallow land provided the basis for annual use totals. Fixed costs per unit of input for power and equipment items plus variable unit costs make up total unit costs (Tables 10, 11, 12, and 13).

The crop adjustments made after allotments resulted in lower annual use of all power and equipment, with only a few exceptions, in spite of an increase in the total producing acreage. This was because the crops substituted for cotton, such as alfalfa seed and more barley, had lower per acre input requirements than cotton. These changes, in the face of constant annual fixed costs, caused an increase in fixed costs per hour. The cotton pickers incurred fixed costs of $3.65 per hour in 1953, and $6.58 in 1955, because fewer acres of cotton were harvested. Equipment items such as the grain drill, spiketooth harrow, and border disk were used more after allotments because they were employed in producing 100 additional acres of barley in 1955. At the same time, other equipment items such as the ditcher and scraper were used fewer hours because of the reduction in cotton acreage.

The fixed costs on equipment which the operator owned but did not use, were charged to the crops on which this equipment was normally used. [1]

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[1]

Equipment item	Fixed costs charged to:
W-1 tractor	Cotton, alfalfa seed
12' x 20' float	All crops
4-row fertilizer attachment	Cotton
4-bale cotton trailer	Cotton
6-bale cotton trailer	Cotton
Grain elevator	Barley
Grain unloader	Barley

TABLE 10

Annual Power and Equipment Hours, 1,100-acre Farm; 1953 and 1955

Item	Cotton			Barley			Alfalfa seed		Milo		Fallow			All crop total	
		total			total			total		total		total			
	per acre	1953 (360 ac)	1955 (200 ac)	per acre	1953 (450 ac)	1955 (550 ac)	per acre	1955 (150 ac)	per acre	1953 (40 ac)	per acre	1953 (200 ac)	1955 (150 ac)	1953	1955
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	hours														
Power:															
T-5D tractor	.78	280.80	156.00	.55	247.50	302.50	.03	4.50	1.12	44.80	.93	186.00	139.50	759.10	602.50
T-7D tractor	2.14	770.40	428.00	.68	306.00	374.00	.74	111.00						1076.40	913.00
W-2 tractor	6.10	2196.00	1220.00				2.50	375.00	1.42	56.80				2252.80	1595.00
Pickup														(30,000 miles)	
Truck														(12,000 miles)	
Equipment:															
5' ditcher	.30	108.00	60.00				.02	3.00	.15	6.00				114.00	63.00
10' scraper	.30	108.00	60.00				.02	3.00	.15	6.00				114.00	63.00
6-blade disk-plow											.41	82.00	61.50	82.00	61.50
8' chisel	.45	162.00	90.00				.15	22.50						162.00	112.50
10' offset disk							.38	57.00							57.00
12' offset disk									.82	32.80	.52	104.00	78.00	136.80	78.00
16' offset disk	.88	316.80	176.00	.68	306.00	374.00	.29	43.50						622.80	593.50
Border disk				.22	99.00	121.00								99.00	121.00
20' spike-tooth harrow				.24	108.00	132.00								a/	a/
30' spike-tooth harrow	.09	32.40	18.00				.06	9.00						104.40	115.00
12' spring-tooth harrow							.40	60.00							60.00

(Continued on next page).

Table 10 Continued.

Item	Cotton			Barley			Alfalfa seed		Milo		Fallow			All crop total	
	per acre	total		per acre	total		per acre	total	per acre	total	per acre	total			
		1953 (360 ac)	1955 (200 ac)		1953 (450 ac)	1955 (550 ac)		1955 (150 ac)		1953 (40 ac)		1953 (200 ac)	1955 (150 ac)	1953	1955
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	hours														
Equipment:															
14' cultipacker	.18	64.80	36.00						.30	12.00				76.80	36.00
4-row lister	.25	90.00	50.00				.10	15.00	.25	10.00				100.00	65.00
4-row lister planter	.31	111.60	62.00				.10	15.00	.31	12.40				124.00	77.00
4-row cultivator	2.26	813.60	452.00				1.52	228.00	.86	34.40				848.00	680.00
1-row cotton picker	2.78	1000.80	556.00											1000.80	556.00
5-bale cotton trailer	1.50	540.00	300.00											540.00	300.00
2-row stalk cutter	.50	180.00	100.00											180.00	100.00
14' grain drill				.30	135.00	165.00								135.00	165.00

a/ The total hours of 20' and 30' spiketooth harrow use are given in terms of the 30' width for purposes of computing per hour costs. Total annual 30' spiketooth harrow hours equal 2/3 of 20' spiketooth hours plus 30' spiketooth harrow hours.

Annual truck mileage is the same in both years. Operators indicated that they drove each pickup truck about 15,000 miles per year and each 1 1/2-ton truck 6,000 miles annually. Cotton was the only crop to which we could allocate direct use of trucks (hauling cotton to the gin required the service of pickup trucks). We allocated the fixed and variable costs of operating trucks to the several crops, as follows: To allow for the relative importance of the cotton enterprise, we considered a cotton acre twice as important as an acre of any other crop. The 1953 calculation illustrates the method of allocation for the two pickup trucks:

Crop	Acres	Weight	Weighted acres	Percent of total	Total miles assigned
Cotton	360	2	720	59.5	17,851
Barley	450	1	450	37.2	11,157
Milo	40	1	40	3.3	992
			1,210	100.0	30,000

Having obtained the total miles allocated to each crop, we calculated miles per acre, these we multiplied by the fixed costs per mile to obtain per acre costs.

Irrigation water.--The 1,100-acre farm pumped 2,234 acre feet of water in 1953 and 2,391 in 1955. We assumed that the total amount of water pumped was equal to the total amount of water required plus 25 percent waste. Per acre requirements of water were as follows:

Crop	1953	1955
	acre inches	
Cotton	37.2	39.0
Barley	15.6	18.0
Milo	25.8	
Alfalfa seed		35.0 a/

a/ Includes a pro-rated share of water required for establishing the alfalfa stand.

The increase in use of the irrigation system after allotments was due to: (1) an increase in the total acreage in crops, (2) higher per acre water applications on cotton and barley, and (3) the introduction of alfalfa seed

production. Water requirements during the peak summer months were lower in 1955 than in 1953, but spring and fall requirements were greater. More water was put on cotton after allotments, but the reduction in cotton acreage caused a drop in total summer irrigation requirements. The water requirements for substitute crops during the peak summer months were not as heavy as those for cotton (Figure 3). If this redistribution of seasonal requirements had not occurred, the increase in total pumping in 1955 might have been difficult to achieve without straining peak season capacity.

Greater total use of the irrigation system in 1955 brought a slight reduction in fixed costs per acre foot of required water. These costs (depreciation, interest, taxes, and insurance) declined from $4.64 per acre foot in 1953 to $4.33 in 1955 (Tables 11 and 13).

Establishing an alfalfa stand.--Farmers who produce alfalfa must establish new stands in accordance with the rotation system used and the normal profitable life of the crop. In this analysis, we distributed the cost of establishing the alfalfa stand over three years. The 1,100-acre farm had 150 acres of alfalfa in 1955. The total cost of establishing this stand was $4,205; one-third of this cost, $1,402, was charged annually to alfalfa production costs.

Labor.--The operator paid total annual salaries of $11,950 to his four regular employees.[1] These salaries were allocated to each crop and to fallow land in accordance with the percentage of total variable labor costs incurred

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[1]

Foreman	$ 4,000
Strawboss	3,000
Shop mechanic	3,750
Part-time bookkeeper.	1,200
	$11,950

[illegible]

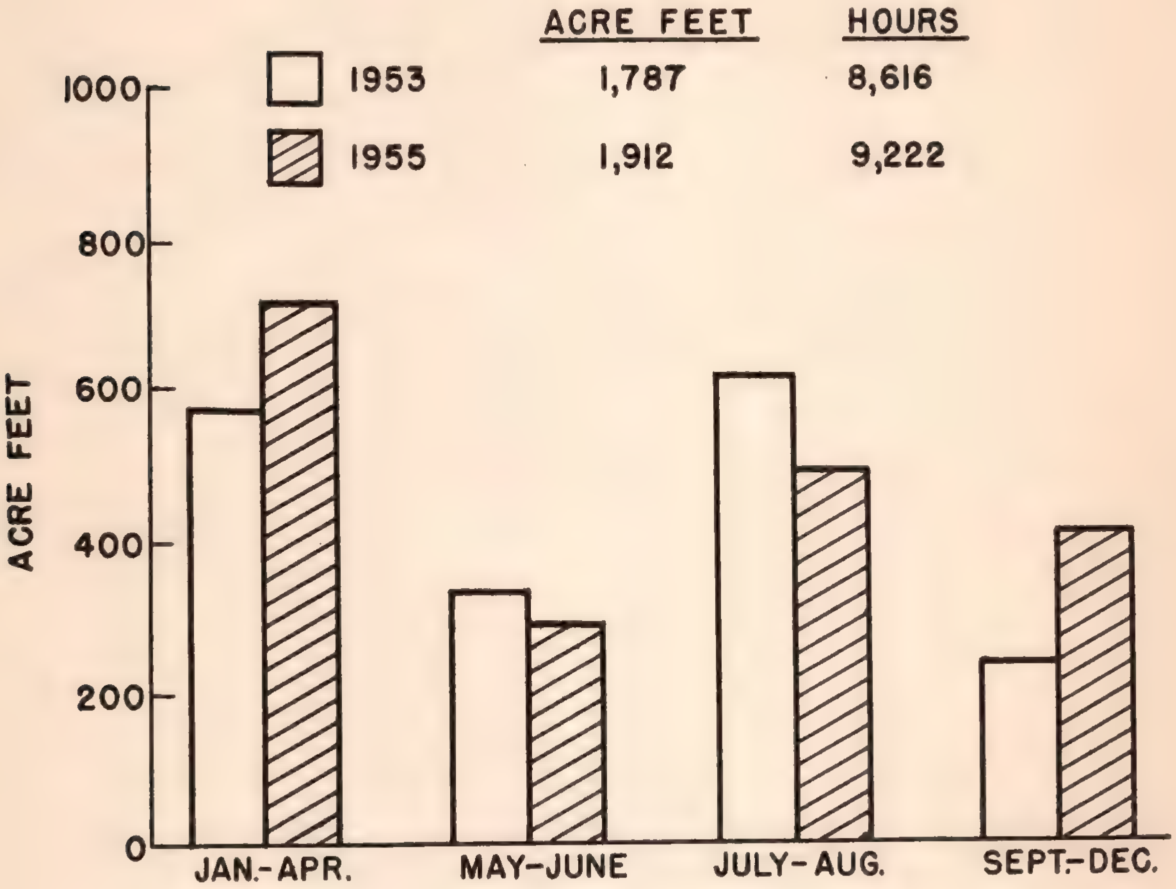
[illegible]

[illegible]

[illegible]

[illegible]

Figure 3. Irrigation Water Requirements, 1,100-acre Farm, 1953-1955.



Source: Calculated from survey data. Water application details set forth in Calendars of Operations, Statistical Supplement, Giannini Mimeo Report No. 212.

TABLE 11

Fixed Costs: Power, Equipment, and Irrigation Water, 1,100-acre Farm; 1953 and 1955

Item	Original cost	Life	Salvage value	Average invest-ment a/	Annual noncash costs			Annual cash costs	Total fixed costs
					depr. b/	int. c/	total	taxes and insur. d/	
	1	2	3	4	5	6	7	8	9
	dollars	years	dollars						
Power:									
T-5D tractor	7,000	10	700	3,850	630.00	192.50	822.50	128.33	950.83
T-7D tractor	11,225	10	1,120	6,172	1,010.50	308.60	1,319.10	205.73	1,524.83
W-1 tractor f/	2,600	6	1,040	1,820	260.00	91.00	351.00	60.67	411.67
W-2 tractor (2)	6,000	6	2,400	4,200	600.00	210.00	810.00	140.00	950.00
Pickup (1/2-ton) (2)	4,000	5	800	2,400	640.00	120.00	760.00	107.99 e/	867.99
Truck (1 1/2-ton) (2)	5,600	10	280	2,940	532.00	147.00	679.00	159.79 e/	838.79
Subtotal							4,741.60	802.51	5,544.11
Equipment:									
5' ditcher	140	10		70	14.00	3.50	17.50	1.75	19.25
10' scraper	520	10		260	52.00	13.00	65.00	6.50	71.50
6-blade disk-plow	1,750	10		875	175.00	43.75	218.75	21.88	240.63
8' chisel	525	10		262	52.50	13.10	65.60	6.55	72.15
10' offset disk	825	10		412	82.50	20.60	103.10	10.30	113.40
12' offset disk	1,050	10		525	105.00	26.25	131.25	13.12	144.37
16' offset disk	1,450	10		725	145.00	36.25	181.25	18.12	199.37
Border disk	175	10		88	17.50	4.40	21.90	2.20	24.10
Spiketooth harrow	300	15		150	20.00	7.50	27.50	3.75	31.25
12' springtooth harrow	240	15		120	16.00	6.00	22.00	3.00	25.00
14' cultipacker	450	10		225	45.00	11.25	56.25	5.62	61.87
12' x 30' float f/	150	20		75	15.00	3.75	18.75	1.88	20.63
4-row lister	350	10		175	35.00	8.75	43.75	4.38	48.13
4-row lister planter	550	10		275	55.00	13.75	68.75	6.88	75.63
4-row cultivator (2)	2,000	10		1,000	200.00	50.00	250.00	25.00	275.00
4-row fertilizer attachment f/	150	10		75	15.00	3.75	18.75	1.88	20.63
1-row cotton picker (2)	17,400	5	3,480	10,440	2,784.00	522.00	3,306.00	348.00	3,654.00

(Continued on next page.)

Table 11 Continued.

Item	Original cost	Life	Salvage value	Average invest-ment a/	Annual noncash costs			Annual cash costs	Total fixed costs
					depr. b/	int. c/	total	taxes and insur. d/	
	1	2	3	4	5	6	7	8	9
	dollars	years	dollars						
Equipment (continued):									
4-bale cotton trailer (3) f/	1,050	5	105	578	189.00	28.90	217.90	14.45	232.35
5-bale cotton trailer (4)	1,600	5	160	880	288.00	44.00	332.00	22.00	354.00
6-bale cotton trailer (3) f/	1,350	5	135	742	243.00	37.10	280.10	18.55	298.65
2-row stalk cutter	325	10		162	32.50	8.10	40.60	4.05	44.65
14' grain drill	850	10		425	85.00	21.25	106.25	10.62	116.87
Grain elevator f/	350	10		175	35.00	8.75	43.75	4.38	48.13
Grain unloader f/	350	10		175	35.00	8.75	43.75	4.38	48.13
Subtotal							5,680.45	559.24	6,239.69
Irrigation water:									
Pumping plant (2)	26,000	12	660	13,330	2,111.67	666.50	2,778.17	641.17	3,419.34
Well and casing	28,000	12		14,000	2,333.33	700.00	3,033.33	673.40	3,706.73
Pipe, stands, & vents	8,770	30		4,385	292.32	219.25	511.57	210.92	722.49
Line gates	306	30		153	10.20	7.65	17.85	7.36	25.21
Alfalfa valves	1,200	30		600	40.00	30.00	70.00	28.86	98.86
Siphons	1,250	5		625	250.00	31.25	281.25	30.06	311.31
Subtotal							6,692.17	1,591.77	8,283.94
Total fixed costs, all items							17,114.22	2,953.52	20,067.74

a/ $\frac{\text{Original cost + Salvage value}}{2}$

b/ $\frac{\text{Original cost - Salvage value}}{\text{Life}}$

c/ 5 percent x average investment

d/ 3.3333 percent x average investment (power and self-powered machinery)
2.5 percent x average investment (equipment)
4.81 percent x average investment (irrigation system)

e/ Includes $25 license and $25 insurance for each pickup.

Includes $25 license and $25 insurance per truck.

f/ Standby equipment.

TABLE 12

Variable Expenses: Power, Equipment, and Irrigation Water, 1,100-acre Farm; 1953 and 1955

Item	1953			1955		
	Fuel & lube a/	Repairs	Total	Fuel & lube a/	Repairs	Total
	1	2	3	4	5	6
	dollars					
Power:						
T-5D tractor	379.55	225.00	604.55	301.25	225.00	526.25
T-7D tractor	699.66	265.00	964.66	593.45	265.00	858.45
W-2 tractor	1,351.68	330.00	1,681.68	957.00	330.00	1,287.00
Pickup (1/2-ton)	750.00	200.00	950.00	750.00	200.00	950.00
Truck (1 1/2-ton)	480.00	168.00	648.00	480.00	168.00	648.00
Subtotal			4,848.89			4,269.70
Equipment:						
5' ditcher		4.20	4.20		4.20	4.20
10' scraper		15.60	15.60		15.60	15.60
6'blade disk-plow		262.50	262.50		262.50	262.50
8' chisel		52.50	52.50		52.50	52.50
10' offset disk					123.75	123.75
12' offset disk		157.50	157.50		157.50	157.50
16' offset disk		217.50	217.50		217.50	217.50
Border disk		17.50	17.50		17.50	17.50
Spiketooth harrow		7.20	7.20		7.20	7.20
12' springtooth harrow					7.20	7.20
14' cultipacker		45.00	45.00		45.00	45.00
4-row lister		52.50	52.50		52.50	52.50
4-row lister planter		55.00	55.00		55.00	55.00
4-row cultivator		400.00	400.00		400.00	400.00
1-row cotton picker		2,910.00	2,910.00		2,910.00	2,910.00
5-bale cotton trailer		48.00	48.00		48.00	48.00
2-row stalk cutter		16.25	16.25		16.25	16.25
14' grain drill		17.00	17.00		17.00	17.00
Subtotal			4,278.25			4,409.20
Irrigation water:	Lube & power b/			Lube & power b/		
Pumping plant	12,782.70	1,560.00	14,342.70	13,364.14	1,560.00	14,924.14
Pipe, stands, & vents		43.85	43.85		43.85	43.85
Line gates		1.53	1.53		1.53	1.53
Alfalfa valves		6.00	6.00		6.00	6.00
Subtotal			14,394.08			14,975.52
Total variable expenses, all items			23,521.22			23,654.42

a/ T-5D: $ .50/hour W-2: $ .60/hour Truck: $ .04/mile
T-7D: $ .65/hour Pickup: $ .025/mile

b/ Power and lube costs obtained as follows:
Power cost = sum of following charges:
(1) Service charge ($750 for 150 h.p. motor)
(2) First 1,000 kw-hrs @ $ .0125 per h.p.
(3) Second 1,000 kw-hrs @ $ .0085 per h.p.
(4) Remaining kw-hrs @ $ .0055 per h.p.
Lube cost = 1 percent of power cost.

$$\text{Kw-hrs} = \frac{\text{Rated h.p. x 100 x .746 x hrs. pumped}}{\text{Motor efficiency}}$$

TABLE 13

Unit Costs[a]: Power, Equipment, and Irrigation Water, 1,100-acre Farm; 1953 and 1955

Item	Unit	Fixed cost per unit		Variable expense per unit		Total cost per unit	
		1953	1955	1953	1955	1953	1955
	1	2	3	4	5	6	7
		dollars					
Power:							
T-5D tractor	hour	1.25	1.58	.80	.87	2.05	2.45
T-7D tractor	hour	1.41	1.67	.90	.94	2.31	2.61
W-2 tractor	hour	.42	.59	.75	.81	1.17	1.40
1/2-ton pickup	mile	.03	.03	.03	.03	.06	.06
1 1/2-ton truck	mile	.07	.07	.05	.05	.12	.12
Equipment:							
5' ditcher	hour	.17	.30	.04	.07	.21	.37
10' scraper	hour	.62	1.13	.14	.25	.76	1.38
6-blade disk-plow	hour	2.94	3.91	3.20	4.27	6.14	8.18
8' chisel	hour	.45	.64	.32	.47	.77	1.11
10' offset disk	hour		1.99		2.17		4.16
12' offset disk	hour	1.06	1.85	1.15	2.02	2.21	3.87
16' offset disk	hour	.32	.33	.35	.37	.67	.70
Border disk	hour	.24	.19	.18	.15	.42	.34
30' spiketooth harrow	hour	.30	.27	.07	.06	.37	.33
12' springtooth harrow	hour		.42		.12		.54
14' cultipacker	hour	.80	1.72	.59	1.25	1.39	2.97
4-row lister	hour	.49	.72	.52	.81	1.01	1.55
4-row lister planter	hour	.61	.99	.44	.71	1.05	1.70
4-row cultivator	hour	.33	.40	.47	.59	.80	.99
1-row cotton picker	hour	3.65	6.58	2.91	5.23	6.56	11.81
5-bale cotton trailer	hour	.65	1.18	.09	.16	.74	1.34
2-row stalk cutter	hour	.25	.45	.09	.16	.34	.61
14' grain drill	hour	.87	.71	.12	.10	.99	.81
Irrigation water:	acre foot	4.64	4.33	8.05	7.83	12.69	12.16

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[a] Rounded.

by each. The method of allocation is the same for each of the farm models. Calculations for the 1,100-acre farm are as follows:

Crop	Variable labor cost	Percent of total variable labor cost	Total fixed labor allocation (Col. 2 x $11,950)	Per acre fixed labor allocation (Col. 3 ÷ acres)
	1	2	3	4
	dollars	percent	dollars	
1953				
Cotton	10,368.00	72	8,604.00	23.90
Barley	3,366.00	23	2,748.50	6.11
Milo	503.20	4	478.00	11.95
Fallow	214.00	1	119.50	.60
Total	14,451.20	100	11,950.00	
1955				
Cotton	5,912.00	47	5,616.50	28.08
Barley	4,180.00	33	3,943.50	7.17
Alfalfa	2,335.00	19	2,270.50	15.14
Fallow	160.50	1	119.50	.80
Total	12,587.50	100	11,950.00	

After allotments, this method of allocation results in an increase in per acre fixed labor costs for cotton, barley, and fallow land (column 4).

An annual charge of 5.8 percent of the total fixed labor cost for social security and compensation insurance is charged to crops and fallow land on the same basis as the above allocation.

Unit Variable Expenses for Power and Equipment Increased Between 1953 and 1955; Contract Services Made up an Important Part of Total Variable Costs

Power and equipment.--The cost elements which make up the variable expenses of power and equipment are fuel, lubrication, and repairs. These costs vary directly with annual use. However, repair costs were assumed to be constant over a range of hours of use; while changes in use of individual items did occur, these changes were not sufficient to affect the repair costs between years. The changes in total variable costs of power and equipment are, therefore, a reflection of changes in fuel and lubrication requirements.

Where a reduction in actual annual use of power and equipment items did occur, an increase in the variable costs per hour of use resulted. This was a direct reflection of the assumed constant repair costs (Tables 12 and 13).

Materials.--(Irrigation water and seed.) The total variable expenses for irrigation water (lubrication, electrical energy, and repairs) accounted for about 19 percent of the total variable expenses for the farm. The total cost of pumping irrigation water is computed on the basis of total requirements plus 25 percent waste. This total cost increased between 1953 and 1955, but the increase was not in direct proportion to the amount of water pumped. The reasons are: (1) repairs were constant over the range of plant use, and (2) electrical energy prices per kilowatt-hour decreases with increases in electrical energy used. The total variable costs per acre foot of water applied were $8.05 in 1953 and $7.83 in 1955 (Tables 12 and 13).

The amount of seed sown per acre and the price paid per pound of seed did not change between years, but the total cost of seed for all crops decreased. The reduction in cotton acreage accounted for this decrease since the price per pound of cotton seed was higher than seed prices for the other crops, except alfalfa; however, the cost of alfalfa seed was charged as a fixed cost.

Fertilizer and pesticides are not included under "Materials" in Table 14 because the operations requiring materials other than irrigation water and seed were contracted.

Labor.--Labor expenses were incurred for tractor and truck drivers, irrigators, and general field workers. Wages on a per hour basis were $1.15 for drivers, $1.00 for irrigators, and $.90 for general labor. The sum of all variable labor expense, including social security and compensation insurance accounted for 20 percent of total farm variable expenses in 1953 and 17 percent in 1955. 1/

1/ Total variable labor costs do not include the cost of labor used to establish an alfalfa stand; this input appeared as a fixed cost and was charged against alfalfa production. Variable labor costs required to establish 150 acres of alfalfa seed totaled $507.00 driver labor, $385.50 for irrigating, $42.00 for general work, and $54.20 for social security and compensation insurance--a total of $988.70.

Truck driving hours were allocated in accordance with the distribution of truck miles explained above. Conversion rates were 40 miles per hour for the pickups and 30 miles per hour for the 1 1/2-ton trucks. There was one exception to this procedure: the pickup driving time in the case of cotton involved two separate calculations. Recall that cotton required pickup truck use for hauling to the gin. To obtain that portion of the total mileage allocated to cotton which went into hauling, we used this formula:

$$\frac{\text{Bales per acre}}{\text{Bale capacity of trailer}} \times 20 \text{ miles } \begin{array}{l}\text{(round trip}\\ \text{from field to}\\ \text{gin and back)}\end{array} = \begin{array}{l}\text{Miles per acre}\\ \text{for hauling}\end{array}$$

For 1953, $\frac{1.9}{5} \times 20 = 7.6$ miles per acre.

We estimated that the driving time required on this operation (and charged to cotton) was 1.5 hours per acre for all farm models in both 1953 and 1955. The rest of the driving time charged to cotton was calculated by using the above conversion rates, i.e., (total allocated miles minus total hauling miles for the crop) ÷ 40 miles per hour for pickups or 30 miles per hour for 1 1/2-ton trucks.

Contract services.--Payments for contract work accounted for a large share of the total farm variable expenses--43 percent in 1953 and 47 percent in 1955. The increase in the incidence of contract work after allotments was due in part to the shift to alfalfa seed production. Contract costs accounted for 63 percent of the production costs for that enterprise. Contract services in cotton production amounted to 45 percent of the variable costs of producing cotton. Contract costs were about 40 percent of the variable expenses associated with barley production.

The fertilization of cotton was contracted in both 1953 and 1955. The rate of fertilizer application increased from 135 pounds of nitrogen equivalent per acre in 1953 to 152 pounds in 1955. The increase in inputs of water, fertilizer, and other factors resulted in a cotton yield increase from 1.9

bales per acre in 1953 to 2.25 bales per acre in 1955. The higher rate of fertilization and yield increased the per acre contract costs for cotton production.

Interest on operating capital for the 1,100-acre farm is 5 percent times one-half the sum of variable expenses for each crop and fallow acres. 1/ We use one-half the sum of variable expenses because production capital is borrowed for approximately six months. There is one exception to this procedure for the 1,100-acre farm: the ginning costs for cotton are not included in calculating interest since this expense falls at the end of the season.

Cost Summary: Per Acre Production Costs for Cotton and Barley Increased in 1955

Total fixed costs for the farm would have been the same after allotments had it not been for the introduction of alfalfa and the purchase of two new pieces of equipment. To summarize, total fixed costs by each cost category were as follows (Table 14): 2/

Item	Total fixed cost (1955)
Power	$ 5,544.11
Equipment	6,239.69
Irrigation system	8,283.94
Real estate taxes	5,500.00
Office expenses	450.00
Improvements	2,589.09
Labor	11,950.00
Establishing alfalfa	1,401.57
Total	$41,958.40
Per acre	38.14

Total variable expenses from the farm increased from $75,099 in 1953 to $76,693 in 1955. Per acre variable expenses for cotton increased from $148 to

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1/ Interest on operating capital and insurance on harvested crops are included under "Contracts" in Table 14 for the purpose of simplification.

2/ Includes $4,377.35 as an imputed charge for interest on investment at the rate of 5 percent. This represents an "opportunity cost" on the operator's capital currently invested in power, equipment, irrigation facilities, and improvements.

TABLE 14

Input Costs by Crops and Total Farm, 1,100-acre Farm; 1955 and 1953

	1955										
Item	Cotton (200 acres)		Barley (550 acres)		Alfalfa seed (150 acres)		Milo (- - - -)		Fallow (150 acres)		Total farm
	per acre	total	per acre	total	per acre	total	per acre	total	per acre	total	
	1	2	3	4	5	6	7	8	9	10	11
	dollars										
Fixed:	90.44	18,088.69	26.55	14,599.44	51.63	7,744.23			12.85	1,926.40	42,358.76
Variable:											
Power	10.48	2,096.00	2.53	1,391.50	3.30	495.00			.81	121.50	4,104.00
Equipment	18.91	3,782.00	.32	176.00	1.77	265.50			2.80	420.00	4,643.50
Materials	27.50	5,500.00	14.94	8,217.00	22.82	3,423.00					17,140.00
Labor	31.27	6,254.90	8.04	4,422.44	14.27	2,140.86			1.13	169.81	12,988.01
Contracts	78.58	15,716.02	18.04	9,922.01	81.08	12,161.37			.12	17.78	37,817.18
Total variable	166.74	33,348.92	43.87	24,128.95	123.24	18,485.73			4.86	729.09	76,692.69
Total cost	257.18	51,437.61	70.42	38,728.39	174.87	26,229.96			17.71	2,655.49	119,051.45
	1953										
	(360 acres)		(450 acres)		(- - - -)		(40 acres)		(200 acres)		
Fixed:	73.02	26,291.12	24.49	11,021.22			36.40	1,456.08	11.65	2,330.86	41,099.28
Variable:											
Power	9.70	3,482.00	2.33	1,048.50			3.26	130.40	.74	148.00	4,808.90
Equipment	11.66	4,197.60	.33	148.50			1.80	72.00	1.91	382.00	4,800.10
Materials	27.03	9,730.80	13.67	6,151.50			17.95	718.00			16,600.30
Labor	30.47	10,969.34	7.91	3,561.23			13.31	532.39	1.13	226.41	15,289.37
Contracts	69.40	24,985.55	17.96	8,081.71			12.85	513.97	.09	18.91	33,600.14
Total variable	148.26	53,365.29	42.20	18,991.44			49.17	1,966.76	3.87	775.32	75,098.81
Total cost	221.28	79,656.41	66.69	30,012.66			85.57	3,422.84	15.52	3,106.18	116,198.09

to $167. The per acre fixed costs charged to cotton increased from $73 to $90 between 1953 and 1955 because of the reduction in the acreage of cotton. Barley costs also rose slightly. The per acre increases reflect changes, such as: (1) higher contract costs (fertilization and processing) associated with increased yields, (2) higher water costs--greater water application offsetting the decrease in water costs per acre foot, and (3) some increase in labor, power, and equipment charges.

Substitute Crops Were Less Profitable Than Cotton; the Post-allotment Cropping Plan Plus a Drop in the Barley Price Meant Lower 1955 Earnings

Although the yield and price of cotton increased, and more acres were cropped, total gross receipts for 1955 were $16,381 less than gross receipts in 1953 (Table 15). [1] This decrease was due to the reduction in cotton acres and to the fact that neither alfalfa seed nor barley were profitable crops. The price decline for barley more than offset the slight increase in the barley yield between 1953 and 1955.

If the increase in the yield and price of cotton had not occurred, total gross receipts in 1955 would have been $120,451 instead of $139,355. In the following table we have indicated the net effect on gross receipts of different yield and price changes for cotton:

Conditions	Gross receipts in 1955	Reduction from observed gross receipts
	1	2
	dollars	
Observed change in YIELD and PRICE of:		
Cotton alone	139,355	
No change in YIELD and PRICE of:		
Cotton alone	120,451	18,904
No change in YIELD of:		
Cotton alone	126,278	13,077
No change in PRICE of:		
Cotton alone	132,457	6,898

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[1] The price of cottonseed declined in 1955, but not enough to offset the gain in lint price.

TABLE 15

Gross Receipts, Costs, and Earnings by Crops and Total Farm, 1,100-acre Farm; 1955 and 1953

	1955						
Item	Cotton lint	Cotton seed	Barley	Alfalfa seed	Milo	Fallow	Total farm
	1	2	3	4	5	6	7
Acres	200		550	150		150	1,050
Yield	2.25 bales a/	.956 ton b/	30 cwt.	550 lbs.			
Production	450 bales	191.2 ton	16,500 cwt.	82,500 lbs.			
Price	$167.30/bale	$46.00/ton	$2.15/cwt.	$ .24/lb.			
	$75,285.00	$8,795.20					
Gross receipts	$84,080.20		$35,475.00	$19,800.00			$139,355.20
Costs (less land)	51,437.61		38,728.39	26,229.96		2,655.49	119,051.45
Receipts minus costs	32,642.59		-3,253.39	-6,429.96		-2,655.49	20,303.75
Land interest ($200/acre c/ @ 5%)	2,250.00		5,583.34	1,583.33		1,583.33	11,000.00
Net	$30,392.59		$-8,836.73	$-8,013.29		$-4,238.82	$ 9,303.75
Add:							
Interest on fixed capital (incl. land)							15,377.35
Net farm income							$ 24,681.10
Less:							
Operator's labor (imputed)							4,000.00
Return to capital and management							$ 20,681.10
Rate earned on investment							6.72%

(Continued on next page.)

Table 15 Continued.

Item	1953 Cotton lint 1	 Cotton seed 2	 Barley 3	 Alfalfa seed 4	 Milo 5	 Fallow 6	 Total farm 7
Acres	360		450		40	200	1,050
Yield	1.9 bales[a]	.808 ton[a]	28 cwt.		40 cwt.		
Production	684 bales	290.7 tons	12,600 cwt.		1,600 cwt.		
Price	$148.99/bale	$53.00/ton	$2.70/cwt.		$2.75/cwt.		
	$101,909.16	$15,407.10					
Gross receipts	$117,316.26		$34,020.00		$4,400.00		$155,736.26
Costs (less land)	79,656.41		30,012.66		3,422.84	3,106.18	116,198.09
Receipts minus costs	$ 37,659.85		$ 4,007.34		$ 977.16	$-3,106.18	$ 39,538.17
Land interest ($200/acre [c] @ 5%)	3,850.00		4,583.34		483.33	2,083.33	11,000.00
Net	$ 33,809.85		$ -576.00		$ 493.83	$-5,189.51	$ 28,538.17
Add:							
Interest on fixed capital (incl. land)							15,350.75
Net farm income							$ 43,888.92
Less:							
Operator's labor (imputed)							4,000.00
Return to capital and management							$ 39,888.92
Rate earned on investment							12.99%

a/ 500 lb. bales (lint: 478 lbs.; bagging and ties: 22 lbs.).

b/ 850 lbs. or 0.425 tons of seed per bale of lint.

c/ Bare land was valued at an arbitrary figure of $200 per acre. This value was estimated from available rental and assessment values and is the figure used for Grades I and II based on all farm models. We found it difficult to obtain a realistic current market value of land on the Westside since property does not change hands frequently enough to suggest an average sale value. We do not present the $200 estimate as a precise market value. Readers should not interpret it as such.

Total gross receipts would have been $9,075 higher than those shown in column 1 above, if the price of barley had remained at $2.70 per hundredweight in 1955.

Total costs for the farm, less interest on land, increased $2,853 while total gross receipts declined by $16,381. Gross receipts-minus-costs were consequently $19,234 lower in 1955 than in 1953 (Figure 4).

The costs deducted from gross receipts to determine these figures include both cash and noncash costs. The noncash costs consist of total depreciation and an imputed interest charge on capital invested in power, equipment, irrigation facilities, and improvements. This interest charge is calculated at 5 percent of the average investment.

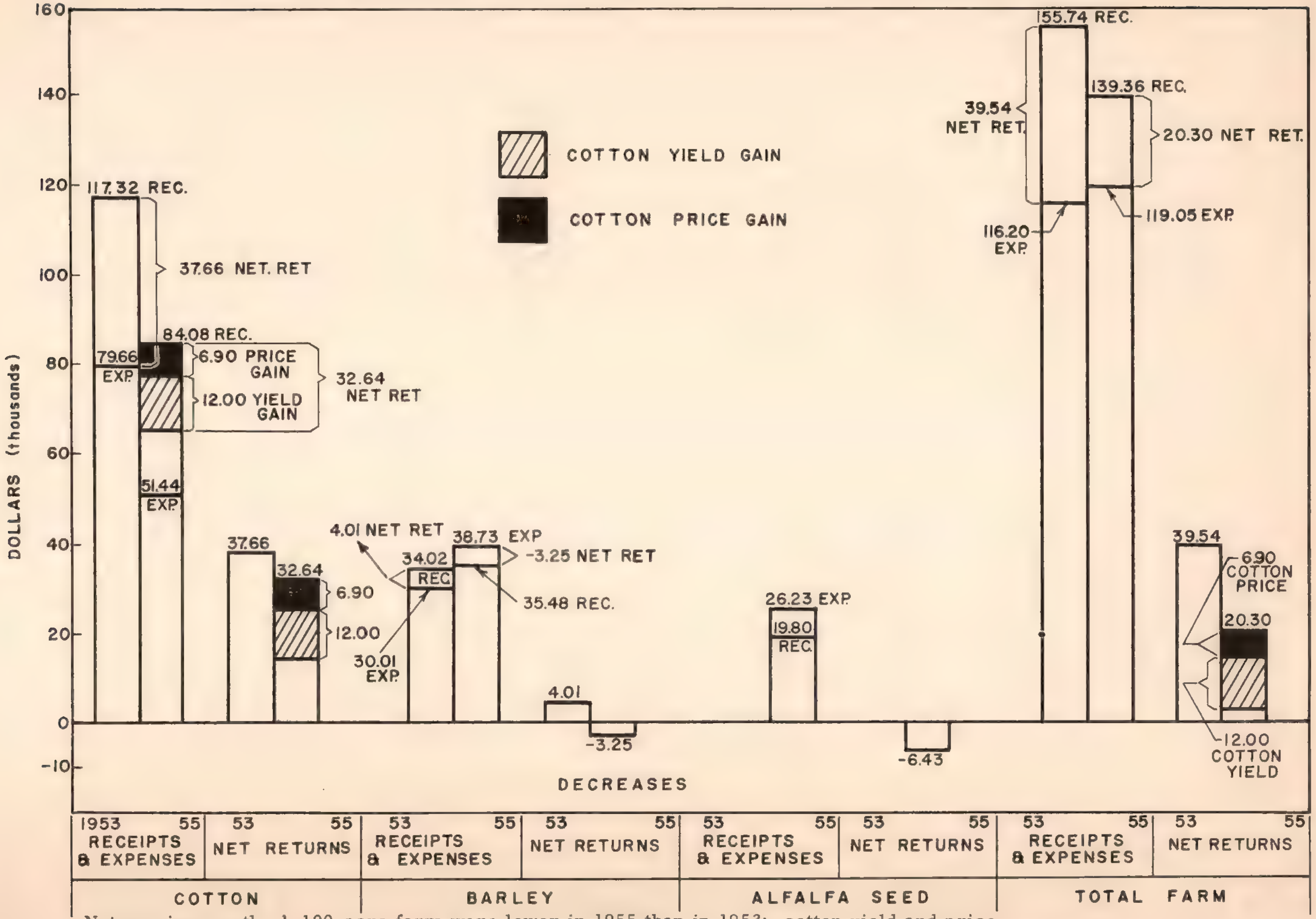
Per acre costs and returns for the 1,100-acre farm were as follows:

Per acre	Cotton		Barley		Milo	Alfalfa seed
	1953	1955	1953	1955	1953	1955
	1	2	3	4	5	6
	dollars					
Gross receipts	325.88	420.40	75.60	64.50	110.00	132.00
Variable expenses	148.26	166.74	42.20	43.87	49.17	123.24
Balance	177.62	253.66	33.40	20.63	60.83	8.76
Fixed costs a/	73.02	90.44	24.49	26.55	36.40	51.63
Balance	104.60	163.22	8.91	-5.92	24.43	-42.87

a/ Does not include interest on land.

Per acre gross receipts from all crops covered their respective per acre variable expenses before and after allotments. The receipts from barley and alfalfa covered only part of the fixed costs allocated to these crops in 1955. Barley returns covered $20.63 of the $26.55 per acre fixed costs assigned to this crop in 1955. The returns to alfalfa seed covered a much smaller proportion of its assigned per acre fixed costs, $8.76 of $51.63. Cotton was by far the most profitable crop in both years. It is impossible to determine from this analysis whether or not other alternative crops would have been more profitable than those included in the cropping plan of this farm.

Figure 4. Changes in Gross Receipts, Expenses, and Net Returns on 1,100-acre Farm in San Joaquin Valley Westside, 1953-1955 (in thousands of dollars).



Net earnings on the 1,100-acre farm were lower in 1955 than in 1953; cotton yield and price increases prevented an even greater decline in earnings. Alfalfa seed and barley had losses in 1955.

Source: Calculated from survey data.

We obtained net receipts by deducting from gross receipts-minus-costs the interest on use of estimated capital invested in land. Net receipts were $28,538 in 1953 and $9,304 in 1955 (Table 15).

Net farm income constitutes the return to the operator for his labor, capital, and management. It represents total gross receipts less (1) all cash costs and (2) depreciation. We obtained this measure by restoring to net receipts total interest on fixed capital, including land. Net farm income on the 1,100-acre farm was $43,889 in 1953 and $24,681 in 1955.

Net cash income (total cash receipts less total cash expenses) is another measure of farm earnings important to all operators, particularly those with nondeferrable financial obligations. 1/ We obtained this measure by restoring total depreciation, a noncash cost, to net farm income. Net cash income on this farm was $58,556 in 1953 and $39,447 in 1955.

If we assume that the operator could have earned $4,000 a year for his labor in an alternative occupation, we can deduct $4,000 from net farm income to show the operator's return to capital and management (profit). This return was $39,889 in 1953 and $20,681 in 1955. We also expressed profit as the rate earned on investment. To do this, we divided the amount of profit by the sum of average farm investments. The 1,100-acre farm had capital earnings of 13.0 percent in 1953 and 6.7 percent in 1955.2/

If the yield of cotton had not increased between 1953 and 1955, the rate earned on investment would have been 2.5 percent. Furthermore, if neither the

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1/ Such obligations of the owner-operator, tenant, or landlord include interest and principal payments on borrowed fixed capital. For the purpose of this analysis, however, we assumed that all fixed assets are fully owned.

2/ Net farm income and profit reflect actual dollar returns, hence the size of the business. The rate earned on investment is useful for comparing different business organizations. These rates reflect the arbitrary $200 land value. Higher land values would mean lower rates earned.

price nor yield of cotton had increased, the rate would have dropped to 0.6 percent. We can readily calculate the rates which correspond to total gross receipts under different price and yield changes (text table, page 39). However, if we assume that no yield increase occurred, farm earnings should not be estimated without first adjusting downward specific cost increases (fertilizer and possibly water) which are associated with higher yields.

2,800-ACRE FARMS: COTTON PRICE AND YIELD INCREASES LESSENED LOSSES DUE TO ALLOTMENTS: EARNINGS INCREASED ON FARMS INTRODUCING SUGAR BEETS, DECREASED FOR COTTON-BARLEY-MELON FARMS

Three farm organization models are used to represent the changes in land use which occurred after the reintroduction of cotton allotments. These models are designated as 2,800-acre Farms 1, 2, and 3 (Table 8, page 29). All three farms are identical as to investments, soil types, and irrigation water facilities. Each farm had 800 acres of cotton in 1953 and 440 acres in 1955. Farms 1 and 2 made the same use of remaining cropland acres in 1953; each had 1,250 acres of barley and 650 idle or fallow acres.

Farms 1 and 2 differed, however, in their crop adjustments to allotments. The operator of Farm 1 used part of his diverted cotton acres for barley and he increased the acreage of idle land. Farm 2 introduced sugar beets and put more acres into crops. Farm 3 had less acreage in barley than Farms 1 and 2. This farm had melons (cantaloupes) in both 1953 and 1955. After allotments, the operator of Farm 3 increased his barley acreage but planted fewer acres in melons.

Total Investment was the Same in Both Years; Operators Increased Inputs of Water and Fertilizer

Capital investments on Farms 1, 2, and 3 totaled $233,702, excluding bare land, in both 1953 and 1955. Investments, by type, were:

Item	Investment (1955 prices)	Percent of total investment
Power [1]	$ 51,471	23
Equipment [2]	42,412	19
Irrigation	104,754	47
Improvements	25,065	11
Total	$223,702	100
Per acre	80	

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[1] Includes $3,640 investment in two W-1 tractors which were typically found on farms of this size but not used in 1953 or 1955.

[2] Includes $7,205 investment in equipment owned but not used in 1953 or 1955.

The new replacement costs of these capital resources totaled $429,530 at 1955 prices (Table 16).

Power units typically found on farms of this size included six wheel tractors (two, W-1; four, W-2) and five tracklayers (one, T-5D; three T-7D; and one T-9D). Other power equipment items were three pickup trucks, two 1 1/2-ton trucks, and one 2-ton truck. The 2,800-acre farm operators had large equipment inventories including three 1-row cotton pickers and two self-propelled 16-foot combines. There were also a number of serviceable power and equipment items, including two W-1 tractors, which were used as standby equipment.

Extensive use was made of contract services, primarily in the production of cotton. These services, as on the 1,100-acre farm, included fertilization, thinning, weeding, dusting, and defoliating. The 2,800-acre farms did not contract the harvesting of barley as was the case on the 1,100-acre farm.

The irrigation facilities included five wells and a pipeline distribution system. Each pumping plant was rated at 1,200 gallons per minute.

As on the 1,100-acre farm, no operator or other family labor was used. The permanent labor force on 2,800-acre farms consisted of: (1) one foreman, (2) two strawbosses, (3) two shop mechanics, and (4) one bookkeeper. Other hired labor consisted of tractor and truck drivers, irrigators, and general field workers.

Inputs of irrigation water on cotton and barley increased after allotments, as did the fertilization rate for cotton. All other measurable practices remained the same.

TABLE 16

Physical Resources and Investments for Typical 2,800-acre Farms, 1955 Prices

Item	Size or capacity	Amount	New cost		Average investment a/	
			per unit	total	per unit	total
	1	2	3	4	5	6
			dollars			
Land:						
Total	2,800 acres					
Total cultivated	2,700 acres					
Improvements:						
Tenant house	2-bedroom	2	3,500.00	7,000.00	1,750.00	3,500.00
Labor cabins		15	500.00	7,500.00	250.00	3,750.00
Shop, storage b/				6,500.00		3,250.00
Tractor, equipment shed				2,500.00		1,250.00
Grain storage	2,500 tons			25,000.00		12,500.00
Fuel storage - gas	1,000 gallons	1		330.00		165.00
Fuel storage - diesel	10,000 gallons	1		1,300.00		650.00
Subtotal				50,130.00		25,065.00
Irrigation system:						
Pumping plant	250 h.p.; 1,200 g.p.m.	5	21,500.00	107,500.00	11,018.75	55,093.75
Well, casing	16" diameter; 450' lift	5x1,700'	10.00	85,000.00	5.00	42,500.00
Pipe	16"	10,560'	1.00	10,560.00	.50	5,280.00
Stands	8' - 36"	5	72.00	360.00	36.00	180.00
Vents	6' - 8"	6	5.60	33.60	2.80	16.80
Line gates	16"	10	186.60	1,866.00	93.30	933.00
Siphons	1" - 3"	1,000	1.50	1,500.00	.75	750.00
Subtotal				206,819.60		104,753.55
Power:						
Tracklayer	T-5D (35-45 h.p.)	1		7,000.00		3,850.00
Tracklayer	T-7D (60-70 h.p.)	3	11,225.00	33,675.00	6,173.75	18,521.25
Tracklayer	T-9D (80-90 h.p.)	1		15,500.00		8,525.00
Wheel tractor	W-1 (20-25 h.p.)	2	2,600.00	5,200.00	1,820.00	3,640.00
Wheel tractor	W-2 (25-35 h.p.)	4	3,000.00	12,000.00	2,100.00	8,400.00
Pickup	1/2-ton	3	2,000.00	6,000.00	1,200.00	3,600.00
Truck	1 1/2-ton	2	2,800.00	5,600.00	1,470.00	2,940.00
Truck	2-ton	1		3,800.00		1,995.00
Subtotal				88,775.00		51,471.25

(Continued on next page.)

Table 16 Continued.

Item	Size or capacity	Amount	New cost		Average investment a/	
			per unit	total	per unit	total
	1	2	3	4	5	6
			dollars			
Equipment:						
Ditcher c/	4'	1		135.00		67.50
Ditcher	5'	2	140.00	280.00	70.00	140.00
Scraper	8'	1		485.00		242.50
Carryall c/	8 yards	1		6,400.00		3,200.00
Landplane	10' x 60'	1		2,700.00		1,350.00
Disk - plow	6-blade	4	1,750.00	7,000.00	875.00	3,500.00
Chisel	10'	1		600.00		300.00
Disk, offset c/	8'	2	725.00	1,450.00	362.50	725.00
Disk, offset	18'	2	1,570.00	3,140.00	785.00	1,570.00
Disk, offset	24'	1		2,100.00		1,050.00
Border disk		1		175.00		87.50
Spiketooth harrow	5' sections	10	50.00	500.00	25.00	250.00
Springtooth harrow c/	4' sections	6	80.00	480.00	40.00	240.00
Cultipacker	12'	3	380.00	1,140.00	190.00	570.00
Drag or float c/	12' x 20'	1		150.00		75.00
Lister	4-row	1		350.00		175.00
Planter	4-row	3	500.00	1,500.00	250.00	750.00
Cultivator	4-row	5	1,000.00	5,000.00	500.00	2,500.00
Fertilizer attachment c/	4-row	2	150.00	300.00	75.00	150.00
Fertilizer spreader c/		2	335.00	670.00	167.50	335.00
Cotton picker	1-row	3	8,700.00	26,100.00	5,220.00	15,660.00
Cotton trailer c/	4-bale	5	350.00	1,750.00	192.50	962.50
Cotton trailer c/	5-bale	5	400.00	2,000.00	220.00	1,100.00
Cotton trailer	6-bale	5	450.00	2,250.00	247.50	1,237.50
Stalk cutter	2-row	2	325.00	650.00	162.50	325.00
Grain drill	12'	2	700.00	1,400.00	350.00	700.00
Harvester (combine) SP	16'	2	7,200.00	14,400.00	2,400.00	4,800.00
Grain elevator c/		1		350.00		175.00
Grain unloader c/		1		350.00		175.00
Subtotal				83,805.00		42,412.50
Total				429,529.60		223,702.30

a/ $\frac{\text{Original cost + Salvage value}}{2}$ Salvage values listed in Table 20.

b/ Includes $3,000 worth of tools, equipment, and parts.

c/ Standby equipment owned but not used in 1953 or 1955.

Fixed Costs Remain Unchanged Between 1953 and 1955

Real estate taxes, improvements, and office costs.--Real estate taxes amounted to $5.00 per acre--an annual cost of $14,000. Improvements represented an annual fixed cost of $4,661.25, as follows: 1/

Depreciation	$2,438.00
Interest @ 5 percent	1,253.25
Repairs	970.00
	$4,661.25

Office costs, excluding bookkeeper wages totaled $750.00.

We allocated these three cost items, taxes, improvements, and office costs, to crops and fallow land on the acreage ratio basis explained in the previous section for the 1,100-acre farm. 2/ This method of allocation results in a redistribution of per acre fixed costs between 1953 and 1955 because of changes in the cropping pattern, but the shift was relatively minor.

Power and equipment.--Cotton allotments caused a decline in annual use of several items, aside from special cotton equipment (Tables 17, 18, and 19). By planting sugar beets on a part of his diverted acreage, the operator of Farm 2 lessened the decline in use of planting and cultivating equipment. The selection of sugar beets, of course, is dependent on being able to obtain an

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1/ As on the 1,100-acre farm, improvements included labor housing and various storage and shop facilities (see Table 16).

2/ To illustrate, real estate taxes were allocated as follows for Farm 1:

2,800-1 Farm				
Crop	Acres	Percent of total producing acres	Total tax cost ($)	Per acre tax cost ($)
	1	2	3	4
1953				
Cotton	800	30	4,200	5.25
Barley	1,250	46	6,440	5.15
Fallow	650	24	3,360	5.17
	2,700	100	14,000	
1955				
Cotton	440	16	2,240	5.09
Barley	1,560	58	8,120	5.20
Fallow	700	26	3,640	5.20
	2,700	100	14,000	

TABLE 17

Annual Power and Equipment Hours, 2,800-1 Farm; 1953 and 1955

Item	Cotton			Barley			Fallow			All crop total	
	per acre	total 1953 (800 acre)	total 1955 (440 acre)	per acre	total 1953 (1250 acre)	total 1955 (1560 acre)	per acre	total 1953 (650 acre)	total 1955 (700 acre)	1953	1955
	1	2	3	4	5	6	7	8	9	10	11
	hours										
Power:											
T-5D tractor	.50	400.00	220.00	.38	475.00	592.80	.41	266.50	287.00	1141.50	1099.80
T-7D tractor (3)	1.49	1192.00	655.60	.72	900.00	1123.20	.40	260.00	280.00	2352.00	2058.80
T-9D tractor	.61	488.00	268.40	.50	625.00	780.00				1113.00	1048.40
W-2 tractor (4)	6.16	4928.00	2710.40							4928.00	2710.40
Pickup - 1/2-ton (3)										(45,000 miles)	
Truck - 1 1/2-ton (2)										(12,000 miles)	
Truck - 2-ton										(5,000 miles)	
Equipment:											
5' ditcher (2)	.30	240.00	132.00							240.00	132.00
8' scraper	.30	240.00	132.00							240.00	132.00
10' x 60' landplane	.72	576.00	316.80	.72	900.00	1123.20				1476.00	1440.00
6-blade disk-plow (4)							.41	266.50	287.00	266.50	287.00
10' chisel	.38	304.00	167.20							304.00	167.20
18' offset disk (2)	.16	128.00	70.40	.50	625.00	780.00	.40	260.00	280.00	1013.00	1130.40
24' offset disk	.45	360.00	198.00							360.00	198.00
Border disk				.22	275.00	343.20				275.00	343.20
20' spiketooth harrow				.18	225.00	280.80				a/	a/
30' spiketooth harrow	.09	72.00	39.60							222.00	226.80
12' cultipacker (3)	.20	160.00	88.00							160.00	88.00
4-row lister	.25	200.00	110.00							200.00	110.00
4-row planter (3)	.31	248.00	136.40							248.00	136.40
4-row cultivator (5)	2.32	1856.00	1020.80							1856.00	1020.80
1-row cotton picker (3)	2.78	2224.00	1223.20							2224.00	1223.20
6-bale cotton trailer (5)	1.50	1200.00	660.00							1200.00	660.00
Stalk cutter (2)	.50	400.00	220.00							400.00	220.00
12' grain drill (2)				.16	200.00	249.60				200.00	249.60
16' combine - SP (2)				.36	450.00	561.60				450.00	561.60

a/ The total hours of 20' and 30' spiketooth harrow use are given in terms of the 30' width for purposes of computing per hour costs. Total annual 30' spiketooth harrow hours equal 2/3 of 20' spiketooth hours plus 30' spiketooth harrow hours.

TABLE 18
Annual Power and Equipment Hours, 2,800-2 Farm; 1953 and 1955

Item	Cotton			Barley			Sugar beets		Fallow			All crop total	
		total			total			total		total			
	per acre	1953 (800 ac)	1955 (440 ac)	per acre	1953 (1250 ac)	1955 (1460 ac)	per acre	1955 (200 ac)	per acre	1953 (650 ac)	1955 (600 ac)	1953	1955
	1	2	3	4	5	6	7	8	9	10	11	12	13
	hours												
Power:													
T-5D tractor	.50	400.00	220.00	.38	475.00	554.80	.35	70.00	.41	266.50	246.00	1141.50	1090.80
T-7D tractor (3)	1.49	1192.00	655.60	.72	900.00	1051.20	1.04	208.00	.40	260.00	240.00	2352.00	2154.80
T-9D tractor	.61	488.00	268.40	.50	625.00	730.00	.68	136.00				1113.00	1134.40
W-2 tractor (4)	6.16	4928.00	2710.40				2.38	476.00				4928.00	3186.40
Pickup - 1/2-ton (3)												(45,000 miles)	
Truck - 1 1/2-ton (2)												(12,000 miles)	
Truck - 2-ton												(5,000 miles)	
Equipment:													
5' ditcher (2)	.30	240.00	132.00				.30	60.00				240.00	192.00
8' scraper	.30	240.00	132.00				.35	70.00				240.00	202.00
10' x 60' landplane	.72	576.00	316.80	.72	900.00	1051.20	.36	72.00				1476.00	1440.00
6-blade disk-plow (4)									.41	266.50	246.00	266.50	246.00
10' chisel	.38	304.00	167.20				.38	76.00				304.00	243.20
18' offset disk (2)	.16	128.00	70.40	.50	625.00	730.00	.68	136.00	.40	260.00	240.00	1013.00	1176.40
24' offset disk	.45	360.00	198.00									360.00	198.00
Border disk				.22	275.00	321.20						275.00	321.20
20' spiketooth harrow				.18	225.00	262.80	.18	36.00				a/	a/
30' spiketooth harrow	.09	72.00	39.60									220.00	238.80
12' cultipacker (3)	.20	160.00	88.00				.20	40.00				160.00	128.00
4-row lister	.25	200.00	110.00				.25	50.00				200.00	160.00
4-row planter (3)	.31	248.00	136.40				.31	62.00				248.00	198.40
4-row cultivator	2.32	1856.00	1020.80				1.62	324.00				1856.00	1344.80
1-row cotton picker(3)	2.78	2224.00	1223.20									2224.00	1223.20
6-bale cotton trailer (5)	1.50	1200.00	660.00									1200.00	660.00
Stalk cutter (2)	.50	400.00	220.00									400.00	220.00
12' grain drill (2)				.16	200.00	233.60						200.00	233.60
16' combine - SP (2)				.38	450.00	525.60						450.00	525.60

a/ The total hours of 20' and 30' spiketooth harrow use are given in terms of the 30' width for purposes of computing per hour costs. Total annual 30' spiketooth harrow hours equal 2/3 of 20' spiketooth hours plus 30' spiketooth harrow hours.

TABLE 19

Annual Power and Equipment Hours, 2,800-3 Farm; 1953 and 1955

	Cotton			Barley			Melons			Fallow			All crop total	
		total			total			total			total			
Item	per acre	1953 (800 ac)	1955 (440 ac)	per acre	1953 (350 ac)	1955 (810 ac)	per acre	1953 (900 ac)	1955 (750 ac)	per acre	1953 (650 ac)	1955 (700 ac)	1953	1955
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	hours													
Power:														
T-5D tractor	.50	400.00	220.00	.38	133.00	307.80	.30	270.00	225.00	.41	266.50	287.00	1069.50	1039.80
T-7D tractor(3)	1.49	1192.00	655.60	.72	252.00	583.20	1.20	1080.00	900.00	.40	260.00	280.00	2784.00	2418.80
T-9D tractor	.61	488.00	268.40	.50	175.00	405.00	.62	558.00	465.00				1221.00	1138.40
W-2 tractor(4)	6.16	4928.00	2710.40				1.42	1278.00	1065.00				6206.00	3775.40
Pickup - 1/2-ton (3)													(45,000 miles)	
Truck - 1 1/2-ton (2)													(12,000 miles)	
Truck - 2-ton													(5,000 miles)	
Equipment:														
5' ditcher(2)	.30	240.00	132.00				.15	135.00	112.50				375.00	244.50
8' scraper	.30	240.00	132.00				.15	135.00	112.50				375.00	244.50
10' x 60' landplane	.72	576.00	316.00	.72	252.00	583.20	.72	648.00	540.00				1476.00	1440.00
6-blade disk-plow (4)										.41	266.50	287.00	266.50	287.00
10' chisel	.38	304.00	167.20				.38	342.00	285.00				646.00	452.20
18' offset disk (2)	.16	128.00	70.40	.50	175.00	405.00	.32	288.00	240.00	.40	260.00	280.00	851.00	995.40
24' offset disk	.45	360.00	198.00				.30	270.00	225.00				630.00	423.00
Border disk				.22	77.00	178.20							77.00	178.20
20' spiketooth harrow				.18	63.00	145.80							a/	a/
30' spiketooth harrow	.09	72.00	39.60				.10	90.00	75.00				204.00	211.80
12' cultipacker (3)	.20	160.00	88.00										160.00	88.00

(Continued on next page.)

Table 19 Continued.

Item	Cotton			Barley			Melons			Fallow			All crop total	
		total			total			total			total			
	per acre	1953 (800 ac)	1955 (440 ac)	per acre	1953 (350 ac)	1955 (810 ac)	per acre	1953 (900 ac)	1955 (750 ac)	per acre	1953 (650 ac)	1955 (700 ac)	1953	1955
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	hours													
Equipment (Continued):														
4-row lister	.25	200.00	110.00				.25	225.00	187.50				425.00	297.50
4-row planter (3)	.31	248.00	136.40				.31	279.00	232.50				527.00	368.90
4-row cultivator (5)	2.32	1856.00	1020.80				.86	774.00	645.00				2630.00	1665.80
1-row cotton picker (3)	2.78	2224.00	1223.20										2224.00	1223.20
6-bale cotton trailer (5)	1.50	1200.00	660.00										1200.00	660.00
Stalk cutter(2)	.50	400.00	220.00										400.00	220.00
12' grain drill (2)				.16	56.00	129.60							56.00	129.60
16' combine - SP (2)				.36	126.00	291.60							126.00	291.60

a/ The total hours of 20' and 30' spiketooth harrow use are given in terms of the 30' width for purposes of computing per hour costs. Total annual 30' spiketooth harrow hours equal 2/3 of 20' spiketooth hours plus 30' spiketooth harrow hours.

allotment. Melons did not lessen this decline on Farm 3 because melons were produced before and after allotments, and because the acreage of melons was smaller after allotments. All three farms grew more barley in 1955 than in 1953; for this reason, several power and equipment items increased in total use for 1955, i.e., border disk, 18-foot offset disks, grain drills, and combines. The increase in fallow acreage on Farms 1 and 3 brought about greater use of the 18-foot disk and the disk-plow on these two farms.

The fixed costs of power and equipment amounted to $26,447 each year 1/ (Table 20). Fixed costs per hour of use in 1955 were higher than in 1953 for all of the items which decreased in annual use between these years (Tables 24, 25, and 26). For example, fixed costs per hour for the cotton pickers increased from $2.47 in 1953 to $4.48 in 1955 on all three farms.

Total annual use of the different-sized trucks was the same in both years: Pickups, 15,000 miles each; 1 1/2-ton trucks, 6,000 miles each; the 2-ton truck, 5,000 miles. We assigned this annual mileage to crops in the manner described for the 1,100-acre farm.

Irrigation water.--The amount of water pumped (total crop requirements plus 25 percent waste) declined between 1953 and 1955 on Farms 1 and 3, but increased on Farm 2 (Figures 5-7). As on the 1,100-acre farm, total water

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1/ We have assigned the fixed costs of idle power and equipment as follows:

Item	Fixed costs charged to:
W-1 tractors	Cotton, melons, sugar beets
4' ditcher	All crops
8-yard carryall	All crops
8' offset disks	Cotton, melons, sugar beets
Springtooth harrow	All crops
12' x 20' float	All crops
4-row fertilizer attachments	Cotton, melons, sugar beets
Fertilizer spreaders	Barley
Cotton trailers	Cotton
Grain elevator	Barley
Grain unloader	Barley

[illegible]. Others did not larger [illegible] than the [illegible] and after [illegible]. All these firms [illegible], for [illegible] in adjacent [illegible], i.e., higher [illegible]. The increase in this [illegible] the firms.

The fixed costs of power and equipment amounted [illegible]

[illegible]

[illegible] declined [illegible] (Figures [illegible]).

[illegible]

[illegible]	Year
[illegible]	[illegible]

TABLE 20

Fixed Costs: Power, Equipment, and Irrigation Water, 2,800-acre Farms; 1953 and 1955

Item	Original cost	Life	Salvage value	Average invest-ment a/	Annual noncash costs			Annual cash costs taxes and insur. d/	Total fixed costs
					depr. b/	int. c/	total		
	1	2	3	4	5	6	7	8	9
	dollars	years	dollars						
Power:									
T-5D tractor	7,000	10	700	3,850.00	630.00	192.50	822.50	128.33	950.83
T-7D tractor (3)	33,675	10	3,360	18,517.00	3,031.50	925.85	3,957.35	617.23	4,574.58
T-9D tractor	15,500	10	1,550	8,525.00	1,395.00	426.25	1,821.25	284.16	2,105.41
W-1 tractor (2)	5,200	6	2,080	3,640.00	520.00	182.00	702.00	121.33	823.33
W-2 tractor (4)	12,000	6	4,800	8,400.00	1,200.00	420.00	1,620.00	280.00	1,900.00
Pickup - 1/2-ton (3)	6,000	5	1,200	3,600.00	960.00	180.00	1,140.00	162.00e/	1,302.00
Truck - 1 1/2-ton (2)	5,600	10	280	2,940.00	532.00	147.00	679.00	159.80e/	838.80
Truck - 2-ton	3,800	10	190	1,995.00	361.00	99.75	460.75	81.64e/	542.39
Subtotal							11,202.85	1,834.49	13,037.34
Equipment:									
4' ditcher f/	135	10		67.50	13.50	3.38	16.88	1.69	18.57
5' ditcher (2)	280	10		140.00	28.00	7.00	35.00	3.50	38.50
8' scraper	485	10		242.50	48.50	12.13	60.63	6.06	66.69
8-yard carryall f/	6,400	15	400	3,400.00	400.00	170.00	570.00	85.00	655.00
10' x 60' landplane	2,700	20		1,350.00	135.00	67.50	202.50	33.75	236.25
6-blade disk-plow (4)	7,000	10		3,500.00	700.00	175.00	875.00	87.50	962.50
10' chisel	600	10		300.00	60.00	15.00	75.00	7.50	82.50
8' offset disk (2) f/	1,450	10		725.00	145.00	36.25	181.25	18.12	199.37
18' offset disk (2)	3,140	10		1,570.00	314.00	78.50	392.50	39.25	431.75
24' offset disk	2,100	10		1,050.00	210.00	52.50	262.50	26.25	288.75
Border disk	175	10		87.50	17.50	4.38	21.88	2.19	24.07
Spiketooth harrow	500	15		250.00	33.33	12.50	45.83	6.25	52.08
Springtooth harrow f/	480	15		240.00	32.00	12.00	44.00	6.00	50.00
12' cultipacker (3)	1,140	10		570.00	114.00	28.50	142.50	14.25	156.75
12' x 20' float f/	150	20		75.00	7.50	3.75	11.25	1.88	13.13
4-row lister	350	10		175.00	35.00	8.75	43.75	4.38	48.13
4-row planter (3)	1,500	10		750.00	150.00	37.50	187.50	18.75	206.25
4-row cultivator (5)	5,000	10		2,500.00	500.00	125.00	625.00	62.50	687.50

(Continued on next page.)

Table 20 Continued.

Item	Original cost	Life	Salvage value	Average invest-ment a/	Annual noncash costs			Annual cash costs taxes and insur. d/	Total fixed costs
					depr. b/	int. c/	total		
	1	2	3	4	5	6	7	8	9
	dollars	years	dollars						
Equipment (Continued):									
4-row fertilizer attachment (2) f/	300	10		150.00	30.00	7.50	37.50	3.75	41.25
Fertilizer spreader(2)f/	670	10		335.00	67.00	16.75	83.75	8.38	92.13
1-row cotton picker (3)	26,100	5	5,220	15,660.00	4,176.00	783.00	4,959.00	521.99	5,480.99
4-bale cotton trailer (5) f/	1,750	5	175	962.50	315.00	48.12	363.12	24.06	387.18
5-bale cotton trailer (5) f/	2,000	5	200	1,100.00	360.00	55.00	415.00	27.50	442.50
6-bale cotton trailer(5)	2,250	5	225	1,237.50	405.00	61.88	466.88	30.94	497.82
Stalk cutter (2)	650	10		325.00	65.00	16.25	81.25	8.12	89.37
12' grain drill (2)	1,400	10		700.00	140.00	35.00	175.00	17.50	192.50
16' combine - SP (2)	14,400	10	2,880	8,640.00	1,152.00	432.00	1,584.00	288.00	1,872.00
Grain elevator f/	350	10		175.00	35.00	8.75	43.75	4.38	48.13
Grain unloader f/	350	10		175.00	35.00	8.75	43.75	4.38	48.13
Subtotal							12,045.97	1,363.82	13,409.79
Irrigation water:									
Pumping plant	107,500	12		55,100.00	8,733.33	2,755.00	11,488.33	2,650.31	14,138.64
Well and casing	85,000	12		42,500.00	7,083.33	2,125.00	9,208.33	2,044.25	11,252.58
Pipe, stands, and vents	10,954	30		5,477.00	365.12	273.85	638.97	263.44	902.41
Line gates	1,866	30		933.00	62.20	46.65	108.85	44.88	153.73
Siphons	1,500	5		750.00	300.00	37.50	337.50	36.08	373.58
Subtotal							21,781.98	5,038.96	26,820.94
Total fixed costs, all items							45,030.80	8,237.27	53,268.07

a/ $\frac{\text{Original cost + Salvage value}}{2}$

b/ $\frac{\text{Original cost - Salvage value}}{\text{Life}}$

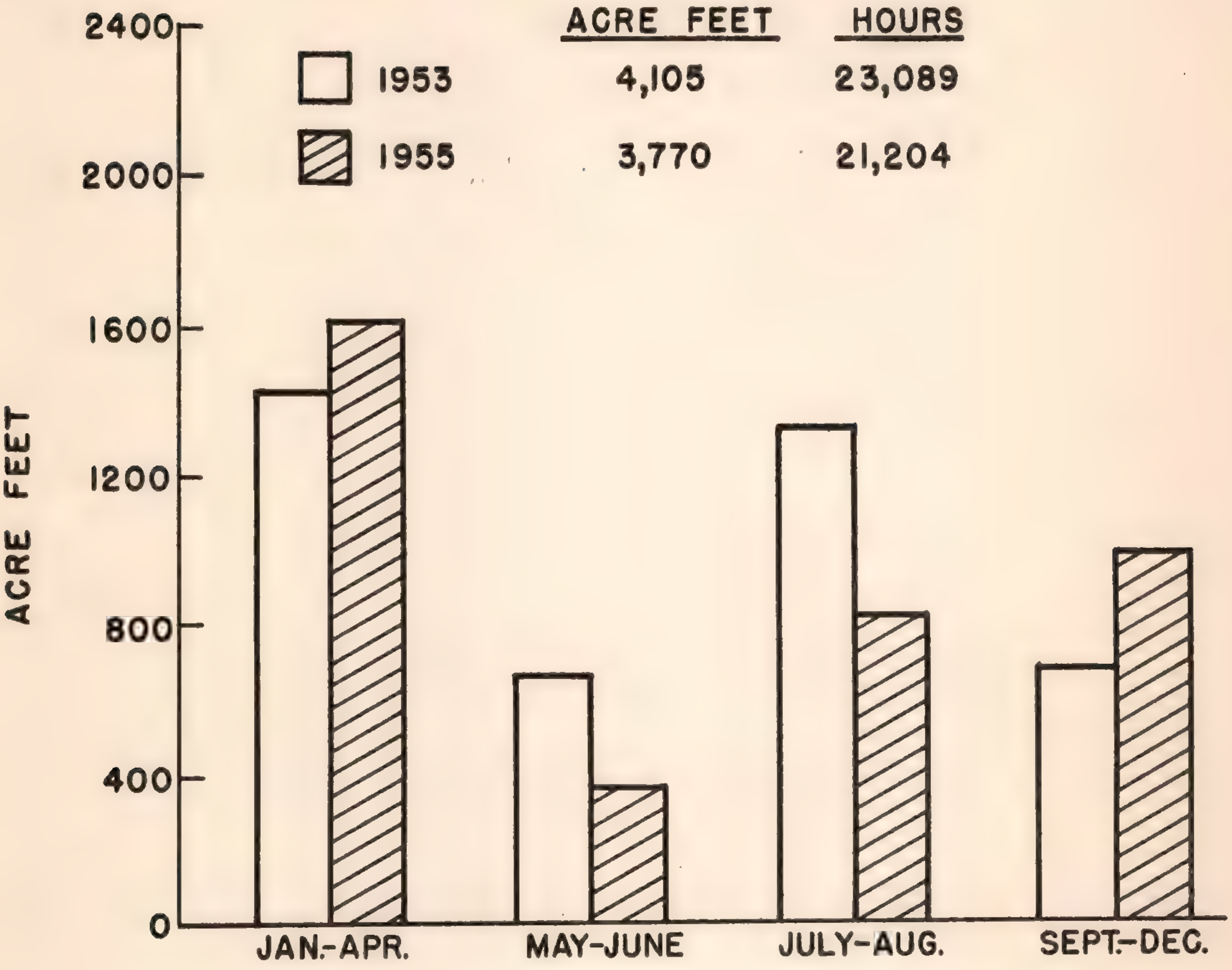
c/ 5 percent x average investment

d/ 3.3333 percent x average investment (power).
2.5 percent x average investment (equipment).
4.81 percent x average investment (irrigation system).

e/ Includes $25 license and $25 insurance per truck.

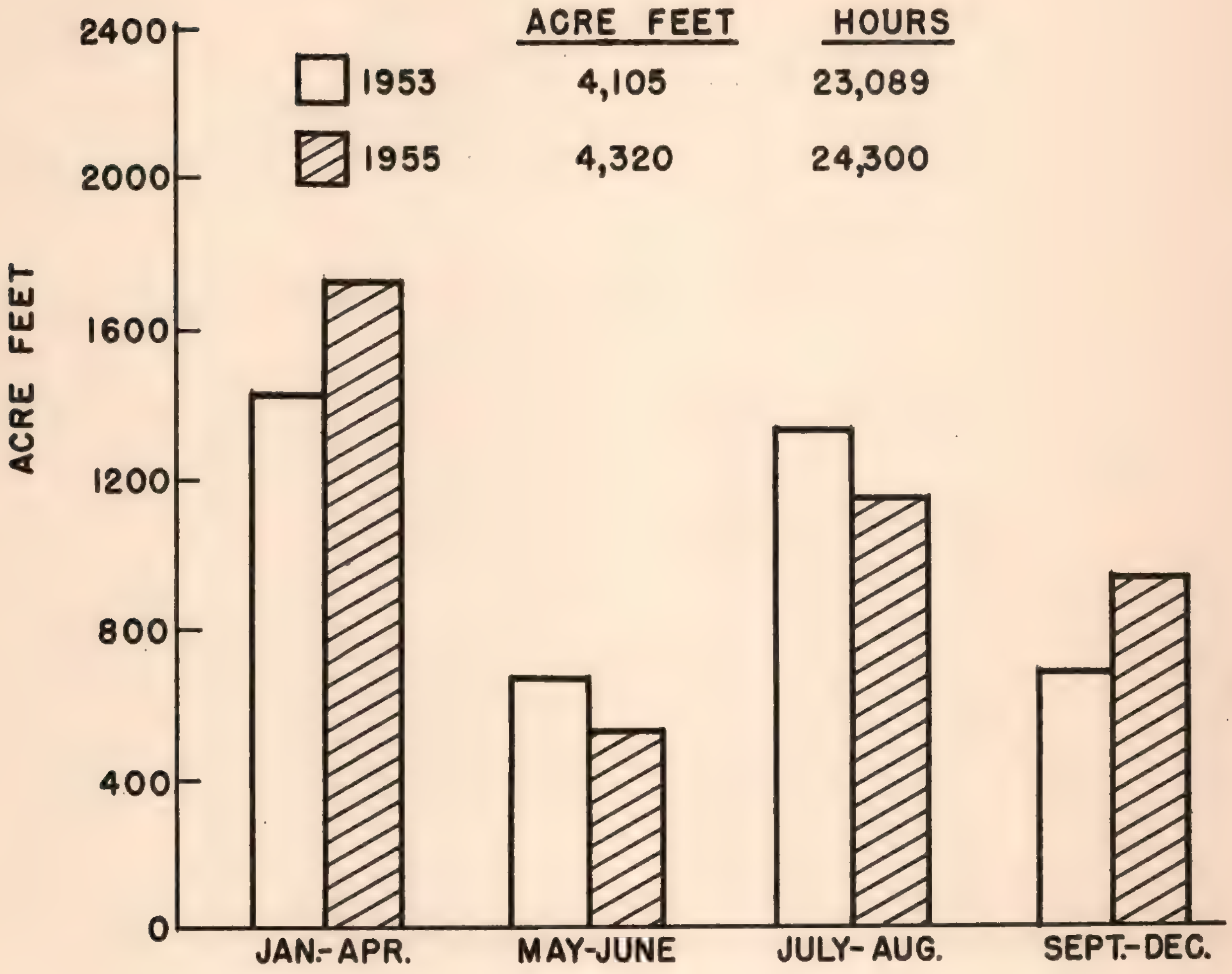
f/ Standby equipment.

Figure 5. Irrigation Water Requirements, 2,800-1 Farm, 1953-1955.



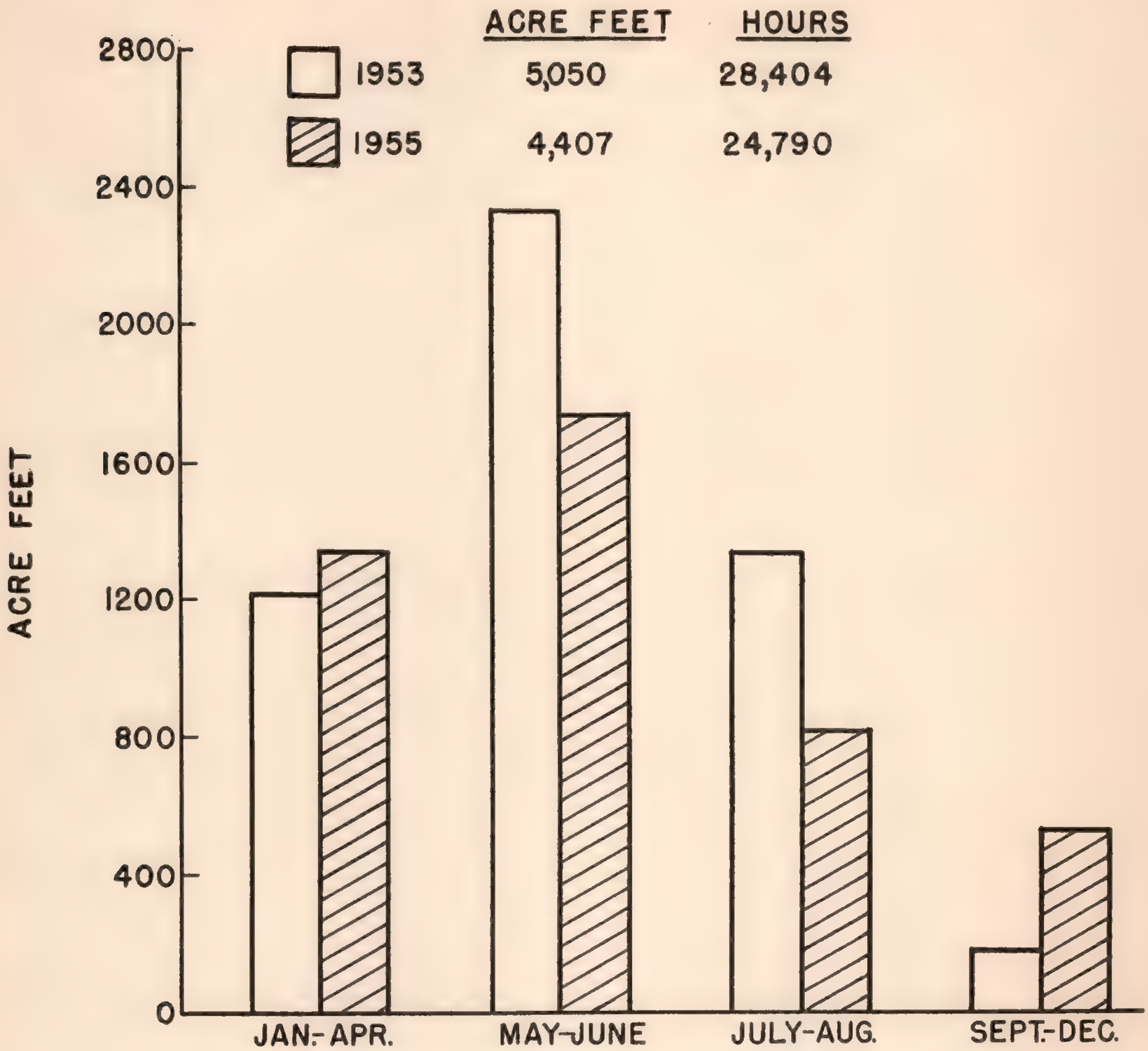
Source: Calculated from survey data. Water application details set forth in Calendars of Operations, Statistical Supplement, Giannini Mimeo Report No. 212.

Figure 6. Irrigation Water Requirements, 2,800-2 Farm 1953-1955.



Source: Calculated from survey data. Water application details set forth in Calendars of Operations, Statistical Supplement, Giannini Mimeo Report No. 212.

Figure 7. Irrigation Water Requirements, 2,800-3 Farm, 1953-1955.



Source: Calculated from survey data. Water application details set forth in Calendars of Operations, Statistical Supplement, Giannini Mimeo Report No. 212.

requirements equal per acre requirements times acres, and the total amount of water pumped equals total requirements plus 25 percent waste.

Per acre requirements were as follows:

Crop	1953	1955
	acre inches/acre	
Cotton	37.2	39.0
Barley	15.6	18.0
Melons	28.2	28.2
Sugar beets		42.0

The lower water use on Farms 1 and 3 in 1955, resulted from the decrease in cotton acreage and from increases in fallow and barley acres. Barley, being a winter crop, has relatively low water requirements. The change in the cropping plan on these two farms more than offset the increase in per acre applications of water on cotton and barley. Farm 2, on the other hand, used more irrigation water after allotments, though not a substantial amount, because of (1) the introduction of sugar beets, (2) the increase in per acre water applications on cotton and barley, and (3) the increase in total acres cropped.

As on the 1,100-acre farm, changes in the cropping plan caused changes in seasonal water requirements (Figures 5-7). Peak season requirements declined on all three farms, but more water was required in the spring and fall. This was due chiefly to the substitution of barley for cotton. Peak season requirements did not decline on Farm 2 as much as on the other two farms because sugar beets required substantial water application in July and August. The highest water requirements on Farm 3 occurred during May and June when the amount of water needed for melons reached a maximum.

The following changes in fixed costs per acre foot of required water occurred between 1953 and 1955 (Tables 20 and 24-26):

	1953	1955
2,800-1 Farm	$6.53	$7.11
2,800-2 Farm	6.53	6.21
2,800-3 Farm	5.31	6.09

Labor.--Annual fixed labor costs were the same on all three farms in both 1953 and 1955. [1] We allocated this labor cost to crops and fallow acres in the manner described for the 1,100-acre farm, i.e., in accordance with the percent of total operating labor costs directly incurred by crops and fallow land. [2] This method of allocation resulted in an increase in per acre labor costs between 1953 and 1955 for cotton, barley, and melons.

Contract and Water Costs Were Major Expense Items

Power and equipment.--The annual repair costs for power and equipment units in 1955 were the same as in 1953 (Tables 21, 22, and 23). [3] Costs per hour of use increased in 1955 for all items which were used less in that year,

---

[1]

Foreman	$ 4,000
Strawboss (2 @ $3,000)	6,000
Shop mechanic	3,750
Shop mechanic	3,400
Bookkeeper	3,000
	$20,150

[2] The allocation for Farm 1, for example, was as follows:

Crop	Variable labor cost	Percent of total variable labor cost	Total fixed labor allocation (Col. 2 x $20,150)	Per acre fixed labor allocation (Col. 3 ÷ acres)
	1	2	3	4
	dollars	percent	dollars	
1953				
Cotton	19,328.00	69	13,903.50	17.38
Barley	7,937.50	29	5,843.50	4.67
Fallow	604.50	2	403.00	.62
Total	27,870.00	100	20,150.00	
1955				
Cotton	10,894.40	50	10,075.00	22.90
Barley	10,077.60	47	9,470.50	6.07
Fallow	651.00	3	604.50	.86
Total	21,623.00	100	20,150.00	

[3] See 1,100-acre farm for explanation of assumptions with respect to repair charges.

while the opposite effect occurred for those items which were used more after allotments (Tables 24, 25, and 26). For example, the expense of operating the cotton pickers increased from $1.96 to $3.57 per hour between 1953 and 1955; for the combines, this cost declined from $5.36 to $4.41. Variable truck expenses per mile were the same in both years. We allocated these costs in accordance with the mileage allocation previously explained.

Materials.--The total variable expenses for irrigation water accounted for 36 to 41 percent of total variable expenses for Farms 1 and 2. Irrigation water costs were only about 13 to 15 percent of total variable expenses on Farm 3 because of the large size of melon contract costs in that organization.

The variable expenses per acre foot of required water increased between 1953 and 1955 on Farms 1 and 3 but decreased on Farm 2. These cost changes were inversely related to changes in the total amount of water pumped. 1/ The reasons for this relationship between use and cost were the same as on the 1,100-acre farm. The variable costs per acre foot of required water were as follows (Tables 21, 22, and 23):

	1953	1955
2,800-1 Farm	$15.01	$15.55
2,800-2 Farm	15.01	14.71
2,800-3 Farm	13.88	14.60

Seed prices, and amounts of seed used per acre, remained the same for all crops. Fertilizer and other materials were included under contract operations on these farms.

Labor.--Total variable labor expenses, including social security and compensation insurance, accounted for 15 to 17 percent of total variable expenses on Farms 1 and 2. Variable labor expenses on Farm 3 accounted for only 6 to 7 percent of all variable expenses because contract service costs in melon production were especially high.

1/ As on the 1,100-acre farm, the total hours of pumping the required amount of water plus waste water determine the total variable cost.

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

[illegible]

TABLE 21

Variable Expenses: Power, Equipment, and Irrigation Water, 2,800-1 Farm; 1953 and 1955

Item	1953			1955		
	Fuel & lube a/	Repairs	Total	Fuel & lube a/	Repairs	Total
	1	2	3	4	5	6
	dollars					
Power:						
T-5D tractor	570.75	225.00	795.75	549.90	225.00	774.90
T-7D tractor (3)	1,528.80	795.00	2,323.80	1,338.22	795.00	2,133.22
T-9D tractor	834.75	300.00	1,134.75	786.30	300.00	1,086.30
W-2 tractor (4)	2,956.80	660.00	3,616.80	1,626.24	660.00	2,286.24
Pickup - 1/2-ton (3)	1,125.00	300.00	1,425.00	1,125.00	300.00	1,425.00
Truck - 1 1/2-ton (2)	480.00	168.00	648.00	480.00	168.00	648.00
Truck - 2-ton	225.00	114.00	339.00	225.00	114.00	339.00
Subtotal			10,283.10			8,692.66
Equipment:						
5' ditcher (2)		8.40	8.40		8.40	8.40
8' scraper		14.55	14.55		14.55	14.55
10' x 60' landplane		135.00	135.00		135.00	135.00
6-blade disk-plow (4)		1,050.00	1,050.00		1,050.00	1,050.00
10' chisel		60.00	60.00		60.00	60.00
18' offset disk (2)		471.00	471.00		471.00	471.00
24' offset disk		315.00	315.00		315.00	315.00
Border disk		17.50	17.50		17.50	17.50
Spiketooth harrow		12.00	12.00		12.00	12.00
12' cultipacker (3)		114.00	114.00		114.00	114.00
4-row lister		52.50	52.50		52.50	52.50
4-row planter (3)		30.00	30.00		30.00	30.00
4-row cultivator (5)		1,000.00	1,000.00		1,000.00	1,000.00
1-row cotton picker (3)		4,365.00	4,365.00		4,365.00	4,365.00
6-bale cotton trailer		67.50	67.50		67.50	67.50
Stalk cutter (2)		32.50	32.50		32.50	32.50
12' grain drill		28.00	28.00		28.00	28.00
16' combine - SP (2)	252.00	2,160.00	2,412.00	314.50	2,160.00	2,474.50
Subtotal			10,184.95			10,247.45
	Lube & power b/			Lube & power b/		
Irrigation water:						
Pumping plant	55,108.45	6,450.00	61,558.45	52,104.05	6,450.00	58,554.05
Pipe, stands, and vents		54.77	54.77		54.77	54.77
Line gates		9.33	9.33		9.33	9.33
Subtotal			61,622.55			58,618.15
Total variable expenses, all items			82,090.60			77,558.26

a/ T-5D: $ .50 per hour W-2: $ .60 per hour 2-ton truck: $.045 per mile
T-7D: $ .65 per hour Pickup: $ .025 per mile
T-9D: $ .75 per hour 1 1/2-ton truck: $ .04 per mile

b/ Power and lube costs obtained as follows:
Power cost = sum of following charges:
(1) Service charge ($1,250 for 250 h.p. motor)
(2) First 1,000 kw-hrs @ $ .012 per h.p.
(3) Second 1,000 kw-hrs @ $ .0085 per h.p.
(4) Remaining kw-hrs @ $ .0055 per h.p.
Lube cost = 1 percent of power cost.

$$\text{Kw-hrs} = \frac{\text{Rated h.p. x 100 x .746 x hrs. pumped}}{\text{Motor efficiency}}$$

TABLE 22
Variable Expenses: Power, Equipment, and Irrigation Water, 2,800-2 Farm; 1953 and 1955

Item	1953			1955		
	Fuel & lube a/	Repairs	Total	Fuel & lube a/	Repairs	Total
	1	2	3	4	5	6
	dollars					
Power:						
T-5D tractor	570.75	225.00	795.75	545.40	225.00	770.40
T-7D tractor (3)	1,528.80	795.00	2,323.80	1,400.62	795.00	2,195.62
T-9D tractor	834.75	300.00	1,134.75	850.80	300.00	1,150.80
W-2 tractor (4)	2,956.80	660.00	3,616.80	1,911.84	660.00	2,571.84
Pickup - 1/2-ton (3)	1,125.00	300.00	1,425.00	1,125.00	300.00	1,425.00
Truck - 1 1/2-ton (2)	480.00	168.00	648.00	480.00	168.00	648.00
Truck - 2-ton	225.00	114.00	339.00	225.00	114.00	339.00
Subtotal			10,283.10			9,100.66
Equipment:						
5' ditcher (2)		8.40	8.40		8.40	8.40
8' scraper		14.55	14.55		14.55	14.55
10' x 60' landplane		135.00	135.00		135.00	135.00
6-blade disk-plow (4)		1,050.00	1,050.00		1,050.00	1,050.00
10' chisel		60.00	60.00		60.00	60.00
18' offset disk (2)		471.00	471.00		471.00	471.00
24' offset disk		315.00	315.00		315.00	315.00
Border disk		17.50	17.50		17.50	17.50
Spiketooth harrow		12.00	12.00		12.00	12.00
12' cultipacker (3)		114.00	114.00		114.00	114.00
4-row lister		52.50	52.50		52.50	52.50
4-row planter (3)		30.00	30.00		30.00	30.00
4-row cultivator (5)		1,000.00	1,000.00		1,000.00	1,000.00
1-row cotton picker (3)		4,365.00	4,365.00		4,365.00	4,365.00
6-bale cotton trailer (5)		67.50	67.50		67.50	67.50
Stalk cutter (2)		32.50	32.50		32.50	32.50
12' grain drill		28.00	28.00		28.00	28.00
16' combine - SP (2)	252.00	2,160.00	2,412.00	294.34	2,160.00	2,454.34
Subtotal			10,184.95			10,227.29
	Lube & power b/			Lube & power b/		
Irrigation water:						
Pumping plant	55,108.45	6,450.00	61,558.45	57,036.95	6,450.00	63,486.95
Pipe, stands, & vents		54.77	54.77		54.77	54.77
Line gates		9.33	9.33		9.33	9.33
Subtotal			61,622.55			63,551.05
Total variable expenses, all items			82,090.60			82,879.00

a/ T-5D: $ .50 per hour W-2: $ .60 per hour 2-ton truck: $ .045 per mile
T-7D: $ .65 per hour Pickup: $ .025 per mile
T-9D: $ .75 per hour 1 1/2-ton truck: $ .04 per mile

b/ Power and lube costs obtained as follows:
Power cost = sum of following charges:
(1) Service charge ($1,250 for 250 h.p. motor)
(2) First 1,000 kw-hrs @ $ .012 per h.p.
(3) Second 1,000 kw-hrs @ $ .0085 per h.p.
(4) Remaining kw-hrs @ $ .0055 per h.p.
Lube cost = 1 percent of power cost.

$$\text{Kw-hrs} = \frac{\text{Rated h.p. x 100 x .746 x hrs. pumped}}{\text{Motor efficiency}}$$

TABLE 23
Variable Expenses: Power, Equipment, and Irrigation Water, 2,800-3 Farm; 1953 and 1955

Item	1953			1955		
	Fuel & lube a/	Repairs	Total	Fuel & lube a/	Repairs	Total
	1	2	3	4	5	6
	dollars					
Power:						
T-5D tractor	534.75	225.00	759.75	519.90	225.00	744.90
T-7D tractor (3)	1,809.60	795.00	2,604.60	1,572.22	795.00	2,367.22
T-9D tractor	915.75	300.00	1,215.75	853.80	300.00	1,153.80
W-2 tractor (4)	3,723.60	660.00	4,383.60	2,265.24	660.00	2,925.24
Pickup - 1/2-ton (3)	1,125.00	300.00	1,425.00	1,125.00	300.00	1,425.00
Truck - 1 1/2-ton (2)	480.00	168.00	648.00	480.00	168.00	645.00
Truck - 2-ton	225.00	114.00	339.00	225.00	114.00	339.00
Subtotal			11,375.70			9,603.16
Equipment:						
5' ditcher (2)		8.40	8.40		8.40	8.40
8' scraper		14.55	14.55		14.55	14.55
10' x 60' landplane		135.00	135.00		135.00	135.00
6-blade disk-plow (4)		1,050.00	1,050.00		1,050.00	1,050.00
10' chisel		60.00	60.00		60.00	60.00
18' offset disk (2)		471.00	471.00		471.00	471.00
24' offset disk		315.00	315.00		315.00	315.00
Border disk		17.50	17.50		17.50	17.50
Spiketooth harrow		12.00	12.00		12.00	12.00
12' cultipacker (3)		114.00	114.00		114.00	114.00
4-row lister		52.50	52.50		52.50	52.50
4-row planter (3)		30.00	30.00		30.00	30.00
4-row cultivator (5)		1,000.00	1,000.00		1,000.00	1,000.00
1-row cotton picker		4,365.00	4,365.00		4,365.00	4,365.00
6-bale cotton trailer (5)		67.50	67.50		67.50	67.50
Stalk cutter (2)		32.50	32.50		32.50	32.50
12' grain drill (2)		28.00	28.00		28.00	28.00
16' combine - SP (2)	70.56	2,160.00	2,230.56	163.30	2,160.00	2,323.30
Subtotal			10,003.51			10,096.25
	Lube & power b/			Lube & power b/		
Irrigation water:						
Pumping plant	63,579.80	6,450.00	70,029.80	57,826.00	6,450.00	64,276.00
Pipe, stands, & vents		54.77	54.77		54.77	54.77
Line gates		9.33	9.33		9.33	9.33
Subtotal			70,093.90			64,340.10
Total variable expenses, all items			91,473.11			84,039.51

a/ T-5D: $ .50 per hour W-2: $ .60 per hour 2-ton truck: $ .045 per mile
T-7D: $ .65 per hour Pickup: $ .025 per mile
T-9D: $ .75 per hour 1 1/2-ton truck: $ .04 per mile

b/ Power and lube costs obtained as follows:
Power cost = sum of following charges:
(1) Service charge ($1,250 for 250 h.p. motor)
(2) First 1,000 kw-hrs @ $ .012 per h.p.
(3) Second 1,000 kw-hrs @ $ .0085 per h.p.
(4) Remaining kw-hrs @ $ .0055 per h.p.
Lube cost = 1 percent of power cost.

$$\text{Kw-hrs} = \frac{\text{Rated h.p. x 100 x .746 x hrs. pumped}}{\text{Motor efficiency}}$$

TABLE 24

Unit Costs [a]: Power, Equipment, and Irrigation Water, 2,800-1 Farm; 1953 and 1955

Item	Unit	Fixed cost per unit		Variable expense per unit		Total cost per unit	
		1953	1955	1953	1955	1953	1955
	1	2	3	4	5	6	7
		dollars					
Power:							
T-5D tractor	hour	.83	.87	.70	.70	1.53	1.57
T-7D tractor	hour	1.94	2.22	.99	1.04	2.93	3.26
T-9D tractor	hour	1.89	2.00	1.02	1.04	2.91	3.04
W-2 tractor	hour	.39	.70	.73	.84	1.12	1.54
1/2-ton pickup	mile	.03	.03	.03	.03	.06	.06
1 1/2-ton truck	mile	.07	.07	.05	.05	.12	.12
2-ton truck	mile	.11	.11	.07	.07	.18	.18
Equipment:							
5' ditcher	hour	.16	.30	.04	.06	.20	.36
8' scraper	hour	.28	.51	.06	.11	.34	.62
10' x 60' landplane	hour	.16	.17	.09	.09	.25	.26
6-blade disk-plow	hour	3.61	3.35	3.94	3.66	7.55	7.01
10' chisel	hour	.27	.49	.20	.36	.47	.85
18' offset disk	hour	.43	.38	.46	.42	.89	.80
24' offset disk	hour	.80	1.46	.88	1.59	1.68	3.05
Border disk	hour	.09	.07	.06	.05	.15	.12
Spiketooth harrow	hour	.24	.23	.05	.05	.29	.28
12' cultipacker	hour	.98	1.78	.71	1.30	1.69	3.08
4-row lister	hour	.24	.44	.26	.48	.50	.92
4-row planter	hour	.83	1.51	.12	.22	.95	1.73
4-row cultivator	hour	.37	.67	.54	.98	.91	1.65
1-row cotton picker	hour	2.47	4.48	1.96	3.57	4.43	8.05
6-bale cotton trailer	hour	.41	.76	.06	.10	.47	.86
Stalk cutter	hour	.22	.40	.08	.15	.30	.55
12' grain drill	hour	.96	.77	.14	.11	1.10	.88
16' combine	hour	4.16	3.33	5.36	4.41	9.52	7.74
Irrigation water:	acre foot	6.53	7.11	15.01	15.55	21.54	22.66

[a] Rounded.

TABLE 25

Unit Costs [a]: Power, Equipment, and Irrigation Water, 2,800-2 Farm; 1953 and 1955

Item	Unit	Fixed cost per unit		Variable expense per unit		Total cost per unit	
		1953	1955	1953	1955	1953	1955
	1	2	3	4	5	6	7
		dollars					
Power:							
T-5D tractor	hour	.83	.87	.70	.71	1.53	1.58
T-7D tractor	hour	1.94	2.12	.99	1.02	2.93	3.14
T-9D tractor	hour	1.89	1.85	1.02	1.02	2.91	2.87
W-2 tractor	hour	.39	.59	.73	.81	1.12	1.40
1/2-ton pickup	mile	.03	.03	.03	.03	.06	.06
1 1/2-ton truck	mile	.07	.07	.05	.05	.12	.12
2-ton truck	mile	.11	.11	.07	.07	.18	.18
Equipment:							
5' ditcher	hour	.16	.20	.04	.04	.20	.24
8' scraper	hour	.28	.33	.06	.07	.34	.40
10' x 60' landplane	hour	.16	.17	.09	.09	.25	.26
6-blade disk-plow	hour	3.61	3.91	3.94	4.27	7.55	8.18
10' chisel	hour	.27	.34	.20	.25	.47	.59
18' offset disk	hour	.43	.37	.46	.40	.89	.77
24' offset disk	hour	.80	1.46	.88	1.59	1.68	3.05
Border disk	hour	.09	.07	.06	.06	.15	.13
Spiketooth harrow	hour	.24	.22	.05	.05	.29	.27
12' cultipacker	hour	.98	1.23	.71	.89	1.69	2.12
4-row lister	hour	.24	.30	.26	.33	.50	.63
4-row planter	hour	.83	1.04	.12	.15	.95	1.19
4-row cultivator	hour	.37	.51	.54	.74	.91	1.25
1-row cotton picker	hour	2.47	4.48	1.96	3.57	4.43	8.05
6-bale cotton trailer	hour	.41	.76	.06	.10	.47	.86
Stalk cutter	hour	.22	.40	.08	.15	.30	.55
12' grain drill	hour	.96	.82	.14	.12	1.10	.94
16' combine	hour	4.16	3.56	5.36	4.67	9.52	8.23
Irrigation water:	acre foot	6.53	6.21	15.01	14.71	21.54	20.92

[a] Rounded.

TABLE 26

Unit Costs [a]: Power, Equipment, and Irrigation Water, 2,800-3 Farm; 1953 and 1955

Item	Unit	Fixed cost per unit		Variable expense per unit		Total cost per unit	
		1953	1955	1953	1955	1953	1955
	1	2	3	4	5	6	7
		dollars					
Power:							
T-5D tractor	hour	.89	.91	.71	.72	1.60	1.63
T-7D tractor	hour	1.64	1.89	.94	.98	2.58	2.87
T-9D tractor	hour	1.72	1.85	1.00	1.01	2.72	2.86
W-2 tractor	hour	.30	.50	.71	.78	1.01	1.28
1/2-ton pickup	mile	.03	.03	.03	.03	.06	.06
1 1/2-truck	mile	.07	.07	.05	.05	.12	.12
2-ton truck	mile	.11	.11	.07	.07	.18	.18
Equipment:							
5' ditcher	hour	.10	.16	.02	.03	.12	.19
8' scraper	hour	.18	.27	.04	.06	.22	.33
10' x 60' landplane	hour	.16	.17	.09	.09	.25	.26
6-blade disk-plow	hour	3.61	3.35	3.94	3.66	7.55	7.01
10' chisel	hour	.13	.19	.09	.13	.22	.32
18' offset disk	hour	.51	.44	.55	.47	1.06	.91
24' offset disk	hour	.46	.69	.50	.74	.96	1.43
Border disk	hour	.31	.13	.23	.10	.54	.23
Spiketooth harrow	hour	.25	.24	.06	.06	.31	.30
12' cultipacker	hour	.98	1.78	.71	1.30	1.69	3.08
4-row lister	hour	.12	.16	.12	.18	.24	.34
4-row planter	hour	.39	.56	.06	.08	.45	.64
4-row cultivator	hour	.26	.41	.38	.60	.64	1.01
1-row cotton picker	hour	2.47	4.48	1.96	3.57	4.43	8.05
6-bale cotton trailer	hour	.41	.76	.06	.10	.47	.86
Stalk cutter	hour	.22	.40	.08	.15	.30	.55
12' grain drill	hour	3.44	1.48	.50	.22	3.94	1.70
16' combine	hour	14.86	6.42	17.70	7.97	32.56	14.39
Irrigation water:	acre foot	5.31	6.08	13.88	14.60	19.19	20.68

[a] Rounded.

We allocated truck driving costs in accordance with the distribution of truck miles, the same method used for the 1,100-acre farm.

Contract services.--Cash outlays for contract services in cotton production accounted for about 41 percent of total variable cotton expenses on all three farms (Tables 27, 28, and 29). Contracts were of major importance in melon production (Farm 3) and sugar beet production (Farm 2). Costs of contract services represented about 86 percent of total variable expenses for melons and 49 percent for sugar beets. The largest contract item in melon production was packing and hauling. The yield was 175 crates per acre with a cost of $1.48 per crate for packing and hauling. Contract expenses accounted for the following percentages of total farm variable costs:

	Percent, 1953	Percent, 1955
2,800-1 Farm	30	23
2,800-2 Farm	30	30
2,800-3 Farm	74	72

The drop in relative importance of contract costs between 1953 and 1955 on Farms 1 and 3 was due to the shift from cotton to barley.

Operators of the 2,800-acre farms contracted fertilization and pest control. They increased the per acre application of NH_3 on cotton from 136 pounds of nitrogen equivalent in 1953 to 156 pounds in 1955. The per acre application on melons and sugar beets was 119 pounds of nitrogen equivalent; this rate of fertilizer application for melon production remained the same after allotments.

Interest on operating capital was calculated in the same manner as for the 1,100-acre farm. The rate of interest used for 2,800-acre farms was 4.5 percent. Several operations were excluded from interest calculations since they occur at the end of the season. These operations are cotton ginning, the harvesting, packing, and hauling of melons, and the harvesting and hauling of sugar beets.

TABLE 27

Input Costs by Crops and Total Farm, 2,800-1 Farm; 1955 and 1953

1955							
	Cotton (440 acres)		Barley (1560 acres)		Fallow (700 acres)		
Item	per acre	total	per acre	total	per acre	total	Total farm
	1	2	3	4	5	6	7
	dollars						
Fixed:	88.14	38,779.15	30.48	47,564.31	10.89	7,625.49	93,968.95
Variable:							
Power	9.21	4,272.40	2.54	3,962.40	.70	490.00	8,724.80
Equipment	13.91	6,122.50	1.91	2,979.60	1.67	1,169.00	10,271.10
Materials	52.61	23,148.40	26.53	41,386.80			64,535.20
Labor	26.20	11,526.28	6.83	10,662.10	.98	688.76	22,877.14
Contracts	75.27	33,120.30	1.93	3,024.88	.08	52.82	36,198.00
Total variable	177.70	78,189.88	39.74	62,015.78	3.43	2,400.58	142,606.24
Total cost	265.84	116,969.03	70.22	109,580.09	14.32	10,026.07	236,575.19
1953							
	(800 acres)		(1250 acres)		(650 acres)		
Fixed:	67.16	53,725.28	26.74	33,424.09	10.60	6,885.57	94,034.94
Variable:							
Power	8.66	6,928.00	2.34	2,925.00	.69	448.50	10,301.50
Equipment	7.71	6,171.89	2.27	2,837.50	1.81	1,176.50	10,185.89
Materials	48.61	38,888.00	22.72	28,400.00			67,288.00
Labor	25.56	20,449.02	6.72	8,397.88	.98	639.56	29,486.46
Contracts	66.49	53,190.37	2.05	2,562.30	.08	50.95	55,803.62
Total variable	157.03	125,627.28	36.10	45,122.68	3.56	2,315.51	173,065.47
Total cost	224.19	179,352.56	62.84	78,546.77	14.16	9,201.08	267,100.41

TABLE 28

Input Costs by Crops and Total Farm, 2,800-2 Farm; 1955 and 1953

Item	Cotton (440 acres)		Barley (1460 acres)		Sugar beets (200 acres)		Fallow (600 acres)		Total farm
	per acre	total	per acre	total	per acre	total	per acre	total	
	1	2	3	4	5	6	7	8	9
					dollars				
1955									
Fixed:	80.92	35,603.20	28.29	41,309.57	53.74	10,748.33	10.79	6,472.84	94,133.94
Variable:									
Power	9.37	4,122.80	2.47	3,606.20	4.87	974.00	.70	420.00	9,123.00
Equipment	13.14	5,783.62	1.99	2,905.40	1.95	390.00	1.91	1,146.00	10,225.02
Materials	49.88	21,947.20	25.27	36,894.20	55.17	11,034.00			69,875.40
Labor	26.12	11,493.69	6.81	9,947.74	16.23	3,245.94	.98	590.36	25,277.73
Contracts	75.19	33,081.55	1.91	2,789.22	81.04	16,207.24	.08	48.52	52,126.53
Total variable	173.70	76,428.86	38.45	56,142.76	159.26	31,851.18	3.67	2,204.88	166,627.68
Total cost	254.62	112,032.06	66.74	97,452.33	213.00	42,599.51	14.46	8,677.72	260,761.62
1953									
	(800 acres)		(1250 acres)				(650 acres)		
Fixed:	67.16	53,725.28	26.74	33,424.09			10.60	6,885.57	94,034.94
Variable:									
Power	8.66	6,928.00	2.34	2,925.00			.69	448.50	10,301.50
Equipment	7.71	6,171.89	2.27	2,837.50			1.81	1,176.50	10,185.89
Materials	48.61	38,888.00	22.72	28,400.00					67,288.00
Labor	25.56	20,449.02	6.72	8,397.88			.98	639.56	29,486.46
Contracts	66.49	53,190.37	2.05	2,562.30			.08	50.95	55,803.62
Total variable	157.03	125,627.28	36.10	45,122.68			3.56	2,315.51	173,065.47
Total cost	224.19	179,352.56	62.84	78,546.77			14.16	9,201.08	267,100.41

TABLE 29

Input Costs by Crops and Total Farm, 2,800-3 Farm; 1955 and 1953

Item	1955								
	Cotton (440 acres)		Barley (810 acres)		Melons (750 acres)		Fallow (700 acres)		Total farm
	per acre	total	per acre	total	per acre	total	per acre	total	
	1	2	3	4	5	6	7	8	9
	dollars								
Fixed:	76.55	33,683.24	29.10	23,576.21	39.14	29,356.01	10.49	7,342.29	93,957.75
Variable:									
Power	9.20	4,048.00	2.48	2,008.80	4.12	3,090.00	.68	476.00	9,622.80
Equipment	12.44	5,473.60	3.24	2,624.40	1.11	832.50	1.69	1,183.00	10,113.50
Materials	49.53	21,793.20	25.11	20,339.10	38.67	29,002.50			71,134.80
Labor	26.20	11,526.28	6.83	5,536.09	12.16	9,117.32	.98	688.76	26,868.45
Contracts	75.16	33,070.16	1.93	1,567.87	377.76	283,317.76	.08	52.82	318,008.61
Total variable	172.53	75,911.24	39.59	32,076.26	433.82	325,360.08	3.43	2,400.58	435,748.16
Total cost	249.08	109,594.48	68.69	55,652.47	472.96	354,716.09	13.92	9,742.87	529,705.91
	1953								
	(800 acres)		(350 acres)		(900 acres)		(650 acres)		
Fixed:	58.56	46,846.60	28.97	10,140.77	33.53	30,177.51	10.53	6,840.07	94,004.95
Variable:									
Power	8.41	6,728.00	2.30	805.00	3.81	3,429.00	.66	429.00	11,391.00
Equipment	7.10	5,680.00	6.86	2,401.00	.84	758.97	1.84	1,196.00	10,035.97
Materials	45.11	36,088.00	21.25	7,437.50	36.98	33,282.00			76,807.50
Labor	25.56	20,449.02	6.72	2,351.40	12.04	10,836.04	.98	639.56	34,276.02
Contracts	66.39	53,111.80	2.12	741.69	377.70	339,933.06	.08	50.95	393,837.50
Total variable	152.57	122,056.82	39.25	13,736.59	431.37	388,239.07	3.56	2,315.51	526,347.99
Total cost	211.13	168,903.42	68.22	23,877.36	464.90	418,416.58	14.09	9,155.58	620,352.94

Per Acre Costs for Cotton, Barley, and Melons Increased in 1955

Total fixed costs for each 2,800-acre farm were the same in 1953 and 1955. There were no changes in inventory or prices used to calculate fixed costs. The total fixed costs, by cost category, were as follows:

Item	Total fixed cost
Power	$13,037.34
Equipment	13,409.79
Irrigation water	26,820.94
Real estate taxes	14,000.00
Office expenses	750.00
Improvements	4,661.25
Labor	20,150.00
Total	$92,829.32[1]
Per acre	33.15

There was a slight difference between the per acre fixed costs on Westside farm models: $38.14 for the 1,100-acre farm, and $33.15 for the larger 2,800-acre units. This difference is due to the fact that, while total fixed costs are higher on the larger farms, the increase in fixed costs is not proportionate to the increase in acreage.

The per acre fixed costs charged to cotton, barley, and melons increased between 1953 and 1955 (Tables 27, 28, and 29) because of the changes which occurred in the acreage of the respective crops.

Total variable expenses decreased for all three farms. However, per acre variable costs for cotton, barley, and melons increased between 1953 and 1955. The increase for cotton was due, as on the 1,100-acre farm, to: (1) higher fertilization and other contract costs which accompanied an increase in cotton yield--the cotton yield was 1.6 bales per acre in 1953 and 2.0 in 1955; (2) increased outlays for water which reflected an increase in per acre application as well as higher costs per acre foot on Farms 1 and 3; (3) higher expenses for power and equipment--these increases were the result of higher

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1/ This total includes $11,387.24 as an imputed charge for interest on investment at the rate of 5 percent.

per unit costs which accompanied lower annual use of certain items; (4) some increase in per acre labor expenses due to higher irrigator requirements and to higher allocated truck driving hours.

The increases in variable per acre costs for barley and melons were relatively small. The barley increase was due, in part, to higher water application and to higher water costs on Farms 1 and 3. These increases plus other minor cost increases were partially offset by decreases in variable expenses for barley equipment, particularly combines. For melons, all costs except outlays for contract services increased slightly. Since contract costs on Farm 3 accounted for a high percent of total variable expenses, the net effect of other cost increases on per acre expense was not significant.

Cotton-Barley-Melon Farms had the Highest Dollar and Percentage Profits, But Only Cotton-Barley-Sugar Beet Farms Showed Increased Earnings Between 1953 and 1955

2,800-1 Farm (Cotton-Barley)

Total gross receipts declined from $324,164 in 1953, to $275,110 in 1955, despite price and yield increases for cotton (Table 30). The reasons for this decline were: (1) reduction in the acreage of cotton, (2) a decline in the price of barley, and (3) an increase in the number of fallow acres. The barley price dropped from $2.70 per hundredweight in 1953, to $2.15 in 1955 for each farm. Without this price decline, 1955 gross receipts on Farm 1 would have been $303,424 instead of $275,110. 1/

The increases in cotton price and per acre yield were the same for each 2,800-acre farm; these increases offset a part of the reduction in gross receipts after allotments. If the cotton price and yield had not increased on Farm 1, gross receipts would have been $231,427. The receipts which could

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1/ A slight increase in barley yield occurred between 1953 and 1955 (from 31 to 33 hundredweight per acre, on each 2,800-acre farm) but this increase did not offset the effect of the barley price decline.

TABLE 30

Gross Receipts, Costs, and Earnings by Crops and Total Farm, 2,800-1 Farm; 1955 and 1953

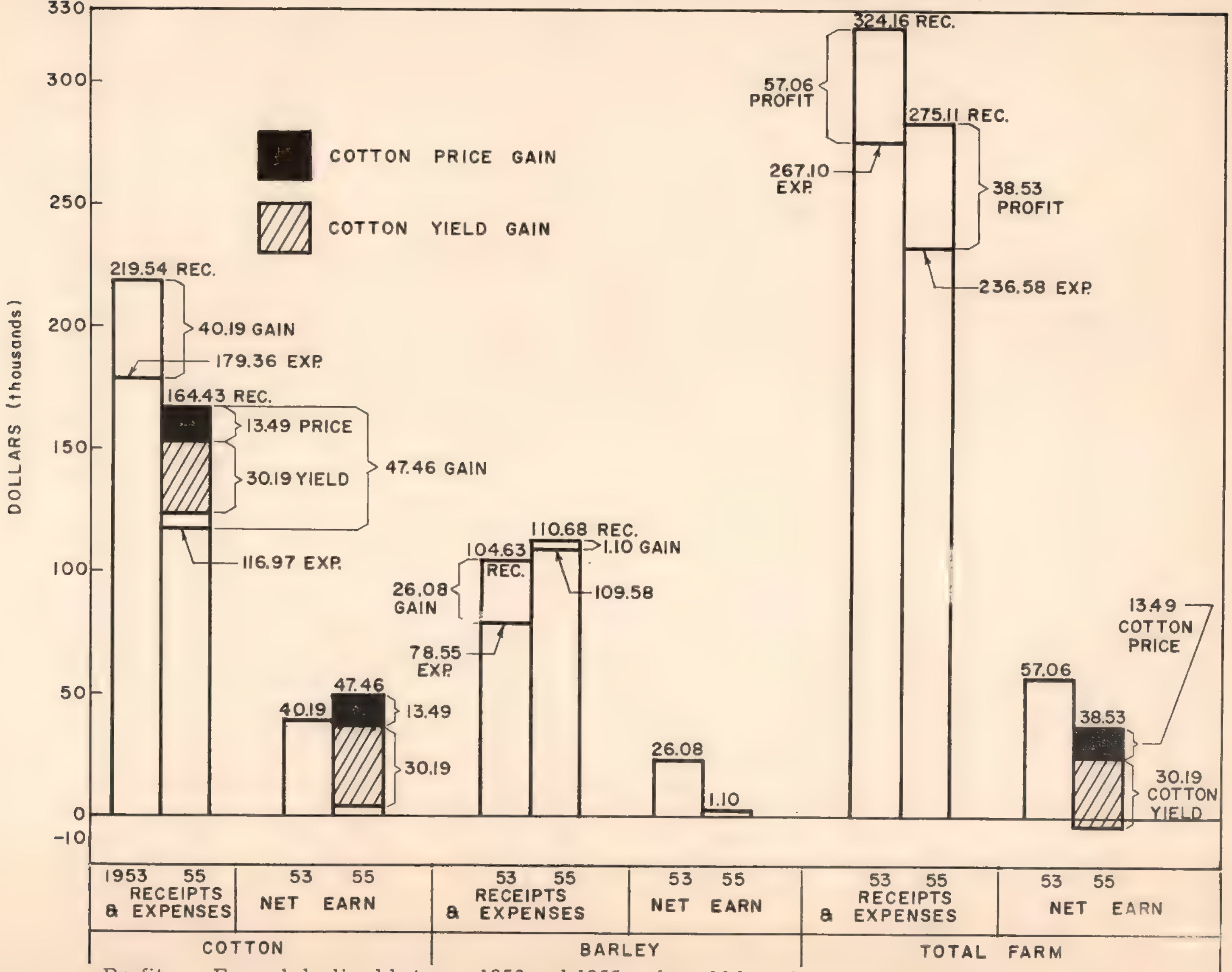
Item	Cotton lint	Cotton seed	Barley	Fallow	Total farm
	1	2	3	4	5
1955					
Acres	440		1,560	700	2,700
Yield	2.0 bales[a]	.850 ton[b]	33 cwt.		
Production	880.0 bales	374 ton	51,480 cwt.		
Price	$167.30/bale	$46.00/ton	$2.15/cwt.		
	$147,224.00	$17,204.00			
Gross receipts	$164,428.00		$110,682.00		$275,110.00
Costs (less land)	116,969.03		109,580.09	10,026.07	236,575.19
Receipts minus costs	47,458.97		1,101.91	-10,026.07	38,534.81
Land interest ($200/acre [c] @ 5%)	4,900.00		15,850.00	7,250.00	28,000.00
Net	$ 42,558.97		$-14,748.09	$-17,276.07	$ 10,534.81
Add:					
Interest on fixed capital (incl. land)					39,387.24
Net farm income					$ 49,922.05
Less:					
Operator's labor (imputed)					4,000.00
Return to capital and management					$ 45,922.05
Rate earned on investment					5.86%
1953					
Acres	800	1,250	650		2,700
Yield	1.6 bales[a]	.680 ton[b]	31 cwt.		
Production	1280.0 bales	544 ton	38,750 cwt.		
Price	$148.99/bale	$53.00/ton	$2.70/cwt.		
	$190,707.20	$28,832.00			
Gross receipts	$219,539.20		$104,625.00		$324,164.20
Costs (less land)	179,352.56		78,546.77	9,201.08	267,100.41
Receipts minus costs	40,186.64		26,078.23	-9,201.08	57,063.79
Land interest ($200/acre [c] @ 5%)	8,500.00		12,750.00	6,750.00	28,000.00
Net	$ 31,686.64		$ 13,328.23	$-15,951.08	$ 29,063.79
Add:					
Interest on fixed capital (incl. land)					39,387.24
Net farm income					$ 68,451.03
Less:					
Operator's labor (imputed)					4,000.00
Return to capital and management					$ 64,451.03
Rate earned on investment					8.22%

[a] 500 lb. bales (lint: 478 lbs.; bagging and ties: 22 lbs.).

[b] 850 lbs. or 0.425 tons of seed per bale of lint.

[c] Bare land was valued at an arbitrary figure of $200 per acre. This value was estimated from available rental and assessment values and is the figure used for Grades I and II based on all farm models. We found it difficult to obtain a realistic current market value of land on the Westside since property does not change hands frequently enough to suggest an average sale value. We do not present the $200 estimate as a precise market value. Readers should not interpret it as such.

Figure 8. Changes in Gross Receipts, Expenses,[a/] and Net Returns on 2,800-1 Farm in San Joaquin Valley Westside, 1953-1955 (in thousands of dollars).



Profits on Farm 1 declined between 1953 and 1955 and would have been negative in 1955 without cotton price and yield gains.

a/ Does not include fallow land expenses.

Source: Calculated from survey data.

have occurred under different yield and price changes for cotton are shown in the following table:

2,800-1 Farm		
Conditions	Gross receipts in 1955	Reduction from observed gross receipts
	1	2
	dollars	
Observed change in YIELD and PRICE of: Cotton alone	275,110	
No change in YIELD and PRICE of: Cotton alone	231,427	43,683
No change in PRICE of: Cotton alone	261,615	13,495
No change in YIELD of: Cotton alone	242,224	32,886

Total costs for Farm 1, excluding interest on land investment, declined from $267,100 in 1953 to $236,575 in 1955. However, gross receipts declined more than costs; receipts-minus-costs dropped from $57,064 to $38,535 (Figure 8). After we deducted land interest, $28,000, net receipts dropped from $29,064 in 1953 to $10,535 in 1955, a decline of 64 percent. The following is a summary of per acre costs and returns for Farm 1:

	2,800-1 Farm			
	Cotton		Barley	
Per acre	1953	1955	1953	1955
	1	2	3	4
	dollars			
Gross receipts	274.42	373.70	83.70	70.95
Variable expenses	157.03	177.70	36.10	39.75
Balance	117.39	196.00	47.60	31.21
Fixed cost a/	67.16	88.14	26.74	30.48
Balance	50.23	107.86	20.86	.73

a/ Does not include interest on land.

Important changes illustrated in this table, are the large increase in net returns from cotton and the decrease in net returns from barley.

Net farm income declined from $68,451 in 1953 to $49,922 in 1955. Net cash income (net farm income plus total depreciation of $37,335 which was the same for all three farms) decreased from $105,786 to $87,257. We deducted $4,000, the same opportunity cost of operator labor used for 1,100-acre farm, from net farm income to obtain an imputed return to capital and management. This return amounted to $64,451 in 1953 and $45,922 in 1955. The rate earned on investment was, consequently, 8.2 percent in the pre-allotment year and 5.9 percent after allotments. If no increase in cotton price and yield had occurred, the rate earned on investment in 1955 would have been 0.3 percent. With the observed cotton price increase, but without the cotton yield gain, the rate would have been 1.7 percent.

2,800-2 Farm (Cotton-Barley-Sugar Beets)

Since Farm 2 was identical to Farm 1 in 1953, the two farms had the same earnings in that year. Their earnings differed in 1955 because they had different cropping plans (Tables 30 and 31).

Total gross receipts on Farm 2 increased between 1953 and 1955 by $3,251, while total costs declined by $6,339. Therefore, gross receipts-minus-costs were $9,590 higher after allotments (Figure 9). The increase in total gross receipts was due to higher per acre cotton receipts, to the introduction of sugar beets, and to the reduction of fallow acreage. Per acre cotton receipts, as on other 2,800-acre farms, increased from $274 to $374. Sugar beets had gross per acre receipts of $297. Farm 2 was the only one of the three 2,800-acre farms having fewer fallow acres in 1955. The increases in total gross receipts occurred in spite of the expansion of the barley enterprise and the reduction in the price of barley. If the barley price had remained at $2.70 in 1955, gross receipts for the farm would have been $26,499 higher than

TABLE 31

Gross Receipts, Costs, and Earnings by Crops and Total Farm, 2,800-2 Farm; 1955 and 1953

	1955					
Items	Cotton lint	Cotton seed	Barley	Sugar beets	Fallow	Total farm
	1	2	3	4	5	6
Acres	440		1,460	200	600	2,700
Yield	2.0 bales[a]	.850 ton[b]	33 cwt.	22 ton		
Production	880.0 bales	374 ton	48,180 cwt.	4,400 ton		
Price	$167.30/bale	$46.00/ton	$2.15/cwt.	$13.50/ton		
	$147,224.00	$17,204.00				
Gross receipts	$164,428.00		$103,587.00	$59,400.00		$327,415.00
Costs (less land)	112,032.06		97,452.33	42,599.51	8,677.72	260,761.62
Receipts minus costs	52,395.94		6,134.67	16,800.49	-8,677.72	66,653.38
Land interest ($200/acre c/ @ 5%)	4,900.00		14,767.00	2,167.00	6,166.00	28,000.00
Net	$ 47,495.94		$ -8,632.33	$14,633.49	$-14,843.72	$ 38,653.38
Add:						
Interest on fixed capital (incl. land)						39,387.24
Net farm income						$ 78,040.62
Less:						
Operator's labor (imputed)						4,000.00
Return to capital and management						$ 74,040.62
Rate earned on investment						9.45%

(Continued on next page.)

Table 31 Continued.

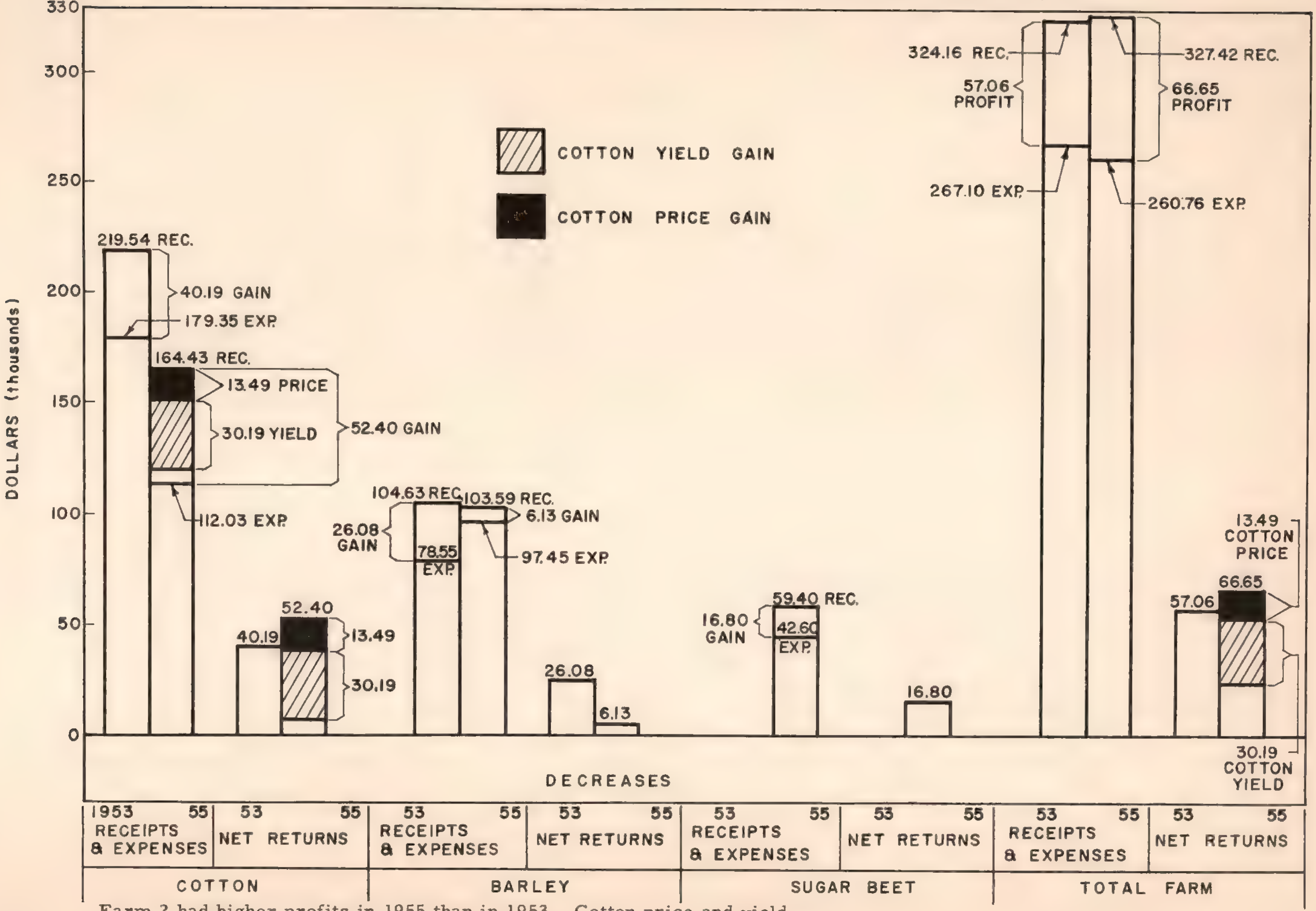
Item	1953 Cotton lint 1	 seed 2	 Barley 3	 Sugar beets 4	 Fallow 5	 Total farm 6
Acres	800		1,250		650	2,700
Yield	1.6 bales[a]	.680 ton[b]	31 cwt.			
Production	1280.0 bales	544 ton	38,750 cwt.			
Price	$148.99/bale	$53.00/ton	$2.15/cwt.			
	$190,707.20	$28,832.00				
Gross receipts	$219,539.20		$104,625.00			$324,164.20
Costs (less land)	179,352.56		78,546.77		9,201.08	267,100.41
Receipts minus costs	40,186.64		26,078.23		-9,201.08	57,063.79
Land interest ($200/acre c/ @ 5%)	8,500.00		12,750.00		6,750.00	28,000.00
Net	$ 31,686.64		$ 13,328.23		$-15,951.08	$ 29,063.79
Add:						
Interest on fixed capital (incl. land)						39,387.24
Net farm income						$ 68,451.03
Less:						
Operator's labor (imputed)						4,000.00
Return to capital and management						$ 64,451.03
Rate earned on investment						8.22%

[a] 500 lb. bales (lint: 478 lbs.; bagging and ties: 22 lbs.).

[b] 850 lbs. or 0.425 tons of seed per bale of lint.

[c] bare land was valued at an arbitrary figure of $200 per acre. This value was estimated from available rental and assessment values and is the figure used for Grades I and II based on all farm models. We found it difficult to obtain a realistic current market value of land on the Westside since property does not change hands frequently enough to suggest an average sale value. We do not present the $200 estimate as a precise market value. Readers should not interpret is as such.

Figure 9. Changes in Gross Receipts, Expenses,[a/] and Net Returns on 2,800-2 Farm in San Joaquin Valley Westside, 1953-1955 (in thousands of dollars).



Farm 2 had higher profits in 1955 than in 1953. Cotton price and yield gains and the planting of sugar beets, a profitable substitute, offset cotton acreage cuts and lower barley returns.

a/ Does not include fallow land expenses.

Source: Calculated from survey data.

observed receipts for that year. Total gross receipts in 1955 would have dropped below 1953 receipts if cotton price and/or yield increases for cotton had not occurred:

2,800-2 Farm		
Conditions	Gross receipts in 1955	Reduction from observed gross receipts
	1	2
	dollars	
Observed change in YIELD and PRICE of: Cotton alone	327,415	
No change in YIELD and PRICE of: Cotton alone	283,732	43,683
No change in PRICE of: Cotton alone	313,920	13,495
No change in YIELD of: Cotton alone	294,529	32,886

The decrease in total farm costs, from $267,100 to $260,762, was smaller than the cost decrease for Farm 1. This was because sugar beet production required variable expenses comparable to those required in cotton production (while barley costs were relatively low) and because Farm 2 had more producing acres in 1955.

Net receipts increased from $29,064 in 1953 to $38,653 in 1955. The per acre costs and returns were as follows:

2,800-2 Farm					
	Cotton		Barley		Sugar beets
Per acre	1953	1955	1953	1955	1955
	1	2	3	4	5
	dollars				
Gross receipts	274.42	373.70	83.70	70.95	297.00
Variable expenses	157.03	173.70	36.10	38.45	159.26
Balance	117.39	200.00	47.60	32.50	137.74
Fixed costs a/	67.16	80.92	26.74	28.29	53.74
Balance	50.23	119.08	20.86	4.21	84.00

a/ Does not include interest on land.

Net per acre returns from cotton and barley were higher in 1955 on Farm 2 than on Farm 1. Since per acre gross receipts from these crops were the same on the two farms in 1953, and changed by the same amounts in 1955, the reason for higher net per acre returns is found in costs.

Net farm income on Farm 2 increased from $68,451 to $78,041 while net cash income rose from $105,786 to $115,375 between 1953 and 1955.

Both profit and rate earned on investment increased in 1955. Profit rose from $64,451 to $74,041 and the rate of earnings increased from 8.2 to 9.4 percent. If no increase in cotton price and yield had occurred, the rate earned would have been 3.9 percent in 1955. With the observed cotton price increase, but without any change from 1953 in the yield of cotton, the rate of earnings would have been 5.2 percent.

2,800-3 Farm (Cotton-Barley-Melons)

Total gross receipts declined on Farm 3 from $729,209 in 1953 to $615,648 in 1955 (Table 32). Total costs, other than land interest, decreased from $620,353 to $529,706 between these two years. Gross receipts-minus-costs declined from $108,856 to $85,942 (Figure 10).

The lower 1955 gross receipts were the result of several changes: (1) the substitution of barley for cotton acres coupled with a decrease in the price of barley, (2) an increase in fallow acres, and (3) a reduction in melon acreage as well as a decline in the price of melons. As on Farms 1 and 2, the barley price declined from $2.70 to $2.15 per hundredweight; the melon price declined from $3.05 to $3.00 per crate. If the prices of barley and melons had been the same in 1955 as they were in 1953, total gross receipts would have been $636,912 instead of $615,648.

The effects on total gross receipts of cotton price and yield increases were relatively more important than price changes for barley and melons. If

TABLE 32

Gross Receipts, Costs, and Earnings by Crops and Total Farm, 2,800-3 Farm; 1955 and 1953

1955						
	Cotton					
Item	lint	seed	Barley	Melons	Fallow	Total farm
	1	2	3	4	5	6
Acres	440		810	750	700	2,700
Yield	2.0 bales[a/]	.850 ton[b/]	33 cwt.	175 crates		
Production	880.0 bales	374 ton	26,730 cwt.	131,250 crates		
Price	$167.30/bale	$46.00/ton	$2.15/cwt.	$3.00/crate		
	$147,224.00	$17,204.00				
Gross receipts	$164,428.00		$57.469.50	$393.750.00		$615.647.50
Costs (less land)	109,594.48		55,652.47	354,716.09	9,742.87	529,705.91
Receipts minus costs	54,833.52		1,817.03	39,033.91	-9,742.87	85,941.59
Land interest ($200/acre c/ @ 5%)	4,900.00		8,267.00	7,667.00	7,166.00	28,000.00
Net	$ 49,933.52		$-6,449.97	$ 31,366.91	$-16,908.87	$ 57,941.59
Add:						
Interest on fixed capital (incl. land)						39,387.24
Net farm income						$ 97,328.83
Less:						
Operator's labor (imputed)						4,000.00
Return to capital and management						$ 93,328.83
Rate earned on investment						11.91%

(Continued on next page.)

Table 32 Continued.

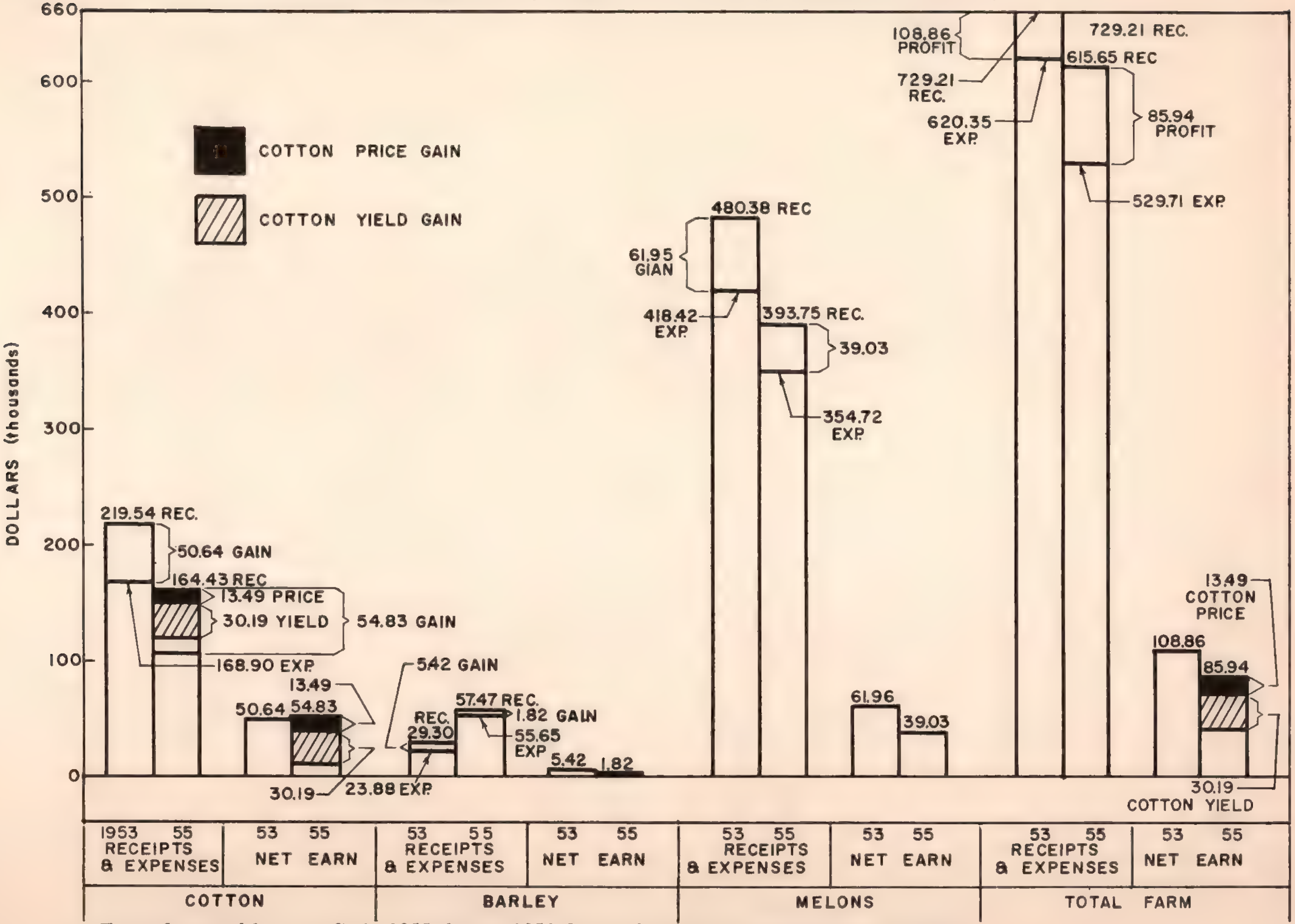
Item	1953					
	Cotton		Barley	Melons	Fallow	Total farm
	lint	seed				
	1	2	3	4	5	6
Acres	800		350	900	650	2,700
Yield	1.6 bales[a]	.680 ton[b]	31 cwt.	175 crates		
Production	1280.0 bales	544 ton	10,850 cwt.	157,500 crates		
Price	$148.99/bale	$53.00/ton	$2.70/cwt.	$3.05/crate		
	$190,707.20	$28,832.00				
Gross receipts	$219,539.20		$29,295.00	$480,375.00		$729,209.20
Costs (less land)	168,903.42		23,877.36	418,416.58	9,155.58	620,352.94
Receipts minus costs	50,635.78		5,417.64	61,958.42	-9,155.58	108,856.26
Land interest ($200/acre c/ @ 5%)	8,500.00		3,667.00	9,167.00	6,666.00	28,000.00
Net	$ 42,135.78		$ 1,750.64	$ 52,791.42	$-15,821.58	$ 80,856.26
Add:						
Interest on fixed capital (incl. land)						39,387.24
Net farm income						$120,243.50
Less:						
Operator's labor (imputed)						4,000.00
Return to capital and management						$116,243.50
Rate earned on investment						14.83%

a/ 500 lb. bales (lint: 478 lbs.; bagging and ties: 22 lbs.).

b/ 850 lbs. or 0.425 tons of seed per bale of lint.

c/ Bare land was valued at an arbitrary figure of $200 per acre. This value was estimated from available rental and assessment values and is the figure used for Grades I and II based on all farm models. We found it difficult to obtain a realistic current market value of land on the Westside since property does not change hands frequently enough to suggest an average sale value. We do not present the $200 estimate as a precise market value. Readers should not interpret it as such.

Figure 10. Changes in Gross Receipts, Expenses,[a] and Net Returns on 2,800-3 Farm in San Joaquin Valley Westside, 1953-1955 (in thousands of dollars).



Farm 3 earned less profit in 1955 than in 1953 due to the cotton acreage cut and to lower barley and melon earnings. Cotton price and yield increases prevented a more significant earnings decline.

a/ Does not include fallow land expenses.

Source: Calculated from survey data.

the price and yield of cotton had not increased, gross receipts for 1955 would have totaled $571,964:

2,800-3 Farm		
Conditions	Gross receipts in 1955	Reduction from observed gross receipts
	1	2
	dollars	
Observed change in YIELD and PRICE of: Cotton alone	615,648	
No change in YIELD and PRICE of: Cotton alone	571,964	43,683
No change in PRICE of: Cotton alone	602,153	13,495
No change in YIELD of: Cotton alone	582,762	32,886

The substantial decrease in total costs, from $620,353 to $529,706, was due primarily to the reduction in cotton and melon acreage. Both of these crops had high per acre variable expenses.

Net receipts on Farm 3 were $80,856 in 1953 and $57,942 in 1955. Per acre costs and returns were as follows:

2,800-3 Farm						
	Cotton		Barley		Melons	
Per acre	1953	1955	1953	1955	1953	1955
	1	2	3	4	5	6
	dollars					
Gross receipts	274.42	373.70	83.70	70.95	533.75	525.00
Variable expenses	152.57	172.53	39.25	39.59	431.37	433.82
Balance	121.85	201.17	44.45	31.36	102.38	91.18
Fixed costs a/	58.56	76.55	28.97	29.10	33.53	39.14
Balance	63.29	124.62	15.48	2.26	68.85	52.04

a/ Does not include interest on land.

Net farm income on Farm 3 declined from $120,244 in 1953 to $97,329 in 1955. Net cash income amounted to $157,578 in 1953, decreasing to $134,664 after allotments.

The return to capital and management was $116,244 in 1953 and $93,329 in 1955. The 1953 rate of earnings on Farm 3 was 14.8 percent; this rate exceeded the rate for Farms 1 and 2 in the same year, i.e., 8.2 percent. The 1955 rate on Farm 3 was 11.9 percent; it exceeded 1955 earnings on the other two farms. Without cotton price and yield increases, Farm 3 earnings would have been 6.3 percent. If there had been no yield increase for cotton, the rate earned on investment would have been 7.7 percent.

[illegible] income of farms declined from $821,[illegible] in 1919 to $77,026 in 19[illegible] [illegible] income amounted to $[illegible], depression to $134,604 [illegible]

[illegible] was $[illegible] in 1919 and 993,029 in 19[illegible]. [illegible] on farms was [illegible] percent; this rate exceeded [illegible] in the same year, i.e., 8.2 percent. The 1919 rate [illegible] was [illegible] percent; it [illegible] to the owner farms.

[illegible]. It [illegible] the rate earned [illegible] have been [illegible] percent.

SUMMARY AND CONCLUSIONS

The climate in the San Joaquin Valley Westside is arid and, therefore, farm operators must rely on irrigation water to supply most of the water requirements for crops. They pump irrigation water from deep well sources. Continuous pumping, furthermore, has brought year-to-year declines in groundwater levels. Investments in pumping facilities are high and tend to increase in the area as a whole as the water level falls. Total costs (fixed and variable) were $12 to $23 per acre-foot of water under 1955 conditions. Historically, irrigation water cost has been increasing.

High profits from cotton during the post-war years largely explain the rapid land development rate in the Westside; this crop occupied the bulk of the land in summer crops before acreage controls. Cotton allotments have presented serious problems. Farmers have had difficulty in finding satisfactory alternative uses for the diverted acres. The high cost level for irrigation water is a major factor in determining net returns. No other crop has been as profitable as cotton; many possible alternatives barely cover production costs at the high water rates. Also, farmers who expand alternative crops heavily must consider the possibility that similar simultaneous action by other growers may increase market offerings enough to cause price declines. This outcome is a particular hazard for specialty crops, but can apply to such staple crops as alfalfa hay and barley. Some promising alternatives, on the other hand, are unavailable to the cotton grower due to production restrictions. Sugar beets, rice, and wheat are examples in California. Lack of a marketing contract, likewide, prevents many growers from producing specialty crops such as melons.

Most Westside growers made only partial or short-run adjustments to cotton allotments rather than changes requiring extensive farm reorganization,

SUMMARY AND CONCLUSIONS

The climate in the San Joaquin Valley westside is arid and, therefore, farm operators must rely on irrigation water to supply most of the water [illegible] [illegible] water levels. Investments in pumping facilities are high and tend to increase in the area as a whole as the water level falls. Total costs (fixed and variable) were $12 to $20 per acre-foot of water under 1955 conditions. Historically, irrigation water cost has been increasing.

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Most Westside growers made only partial or short-run adjustments to [illegible] heavy additional investments, and/or a waiting period before receiving earnings. They planted diverted cotton acres largely to annual grains; some increased fallow land substantially. A few growers with sufficient water actually increased total crop acreage after allotments.

Cotton yields have increased steadily since 1954. [1] Some reasons are: (1) heavier fertilization, (2) more careful field selection and land management, and (3) improved cultural practices. Among the latter are more carefully prepared seedbeds, land rearrangement to improve irrigation water distribution and penetration, and more effective timing for cultural operations. Farmers have succeeded, through yield gains, in offsetting an important part (but not all) of the total production decrease that acre reductions otherwise would have caused.

The farm models used in this study had the following investments and fixed costs in 1953 and 1955, excluding the investment in land:

Acres in farm	Average investment [a]		Fixed costs	
	total	per acre	total	per acre
1,100	$ 87,545	$80	$41,958	$38
2,800	223,702	80	92,829	33

[a] Excludes an arbitrary estimate of $200 per acre for bareland value used in the earnings analysis to facilitate comparisons among farm models.

One of the important impacts of reduced cotton acres was to increase the unit costs per acre or per output unit for much of the rowcrop equipment on Westside farms. An opposite effect resulted, however, for a few equipment

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[1] We used per acre yields in this study ranging from 1.6 to 2.0 bales (765 to 956 pounds) per acre. California state-wide yields per acre averaged 774 pounds in 1955, 924 in 1956, and 1,035 in 1957. The September 1 estimate for 1958 was 1,097 pounds, according to the California Field Crop Report, California Crop and Livestock Reporting Service.

items, such as combines used to harvest grain. Reduced cotton acres meant that growers owning cotton harvesters had fewer acres to pick, but those with combines who seeded diverted acres to barley, had more acres to cover and could use more combine capacity. Total fixed costs remained unchanged from 1953 to 1955 for both equipment items; costs per acre, therefore, rose for cotton harvesters, but declined for grain combines. The problem of increasing unit costs for equipment would have been more serious, except that growers use contract services extensively for pest control, fertilization, some harvesting, and certain other operations. Contracting is less expensive in many cases than owning the necessary equipment. Contracting also provides a means of making short-run adjustments that involve adding enterprises requiring different equipment than is owned, without heavy capital investments.

Total variable expenses per acre on cotton increased from 1953 to 1955. This was due to (1) higher unit costs for power and equipment, (2) additional fertilizer and water inputs, and (3) increased harvesting and processing costs accompanying higher yields.

Total farm receipts decreased from 1953 to 1955 for all farm models except the 2,800-2 cotton-barley-sugar beets unit, due to three changes: (1) total cotton receipts dropped, (2) prices for barley and melons declined, (3) the operators expanded acres in barley, a low return crop. Higher cotton yields and prices tended to offset these unfavorable influences. 1/ Net farm income was still relatively favorable.

1/ Gross receipts from cotton increased by $15.34 per bale.

The following text table summarizes the earnings for the four farm models, according to our analysis:

Farm	1953				1955			
	Net cash income a/	Net farm income b/	Profit c/	Rate earned d/	Net cash income a/	Net farm income b/	Profit c/	Rate earned d/
	1	2	3	4	5	6	7	8
	dollars			percent	dollars			percent
1,100-acre	56,556	43,889	39,889	13.0	39,447	24,681	20,681	6.7
2,800-acre								
Farm 1	105,786	68,451	64,451	8.2	87,257	49,922	45,922	5.9
Farm 2	105,786	68,451	64,451	8.2	115,375	78,041	74,041	9.4
Farm 3	157,578	120,244	116,244	14.8	134,664	97,329	93,329	11.9

a/ (Total gross receipts) minus (all cash costs).

b/ (Total gross receipts) minus (all cash costs plus depreciation). Net farm income is the return to the operator for his labor, management, and capital.

c/ (Net farm income) minus (the opportunity cost of the operator labor). Profit is the return to the operator for his capital and management.

d/ Profit expressed as a percent of total farm investment.

We also show in the following comparison how importantly cotton yield increases from 1953 to 1955 contributed to maintaining farm profits:

Farm	Rate of earnings in		
	1953	1955	
		(with cotton yield increase)	(without cotton yield increase)
	1	2	3
	percent		
1,100-acre	13.0	6.7	2.5
2,800-acre			
Farm 1	8.2	5.9	1.7
Farm 2	8.2	9.4	5.2
Farm 3	14.8	11.9	7.7

What may we conclude from the above findings regarding cotton acreage allotment impacts on Westside farm operators, and how the latter adjusted to these production control mechanisms? Our conclusions apply primarily and

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

specifically, to the four models (one 1,100-acre and three 2,800-acre farms) in this study:

(1) Cotton was the most profitable staple crop on the Westside. It also out-earned all specialty crops, except for melons on the 2,800-3 farm in 1953. The latter crop lost its advantage on this unit in 1955, and ranked below cotton.

(2) Melons and sugar beets were the only crops with earnings approaching cotton's profits; the first is subject to serious market hazards, and the second, like cotton, is under production restrictions. The general problem with the specialty crops is their limited scope for expansion without generating marketing and price difficulties that may sharply lower their profit potential for both new growers and those previously producing them.

(3) Westside cotton producers face a unique problem in the nature and seriousness of their problems in obtaining adequate quantities of irrigation water at costs permitting them to operate. This is an important influence that limits their crop choices and hampers them in adjusting to cotton acreage allotments. Their difficult water situation is further complicated for individual growers because they rent most of the land, but have their own money invested in improvements. Often these growers have annual cash obligations on such improvements equal to, or exceeding, the noncash fixed costs we applied in this analysis. These conditions also handicap growers in adjusting to reduced cotton acres and earnings.

(4) Most Westside growers relied on short-term shifts in their efforts to adjust to cotton acreage allotments. They found their most effective answers in measures that boosted cotton yields. We can expect that farmers, faced with restrictive allotments, will continue to use all economic means to increase yields. They will, in addition, keep alert for new crops, and for methods of cutting costs or increasing receipts and thus obtaining higher profits from those presently grown.

(5) High fixed costs on owned equipment and facilities become a difficult problem under acreage allotments. The total costs apply to fewer acres and units of production, with the result that costs per unit rise. The fewer tasks that a piece of equipment can perform, and the greater the investment and costs in it, the more serious this problem becomes. Thus, the fixed cost per bale for machine-picking cotton would have almost doubled between 1953 and 1955 except for the effect of yield gains. The latter fell far short of solving the cost rise problem completely.

(6) Price changes exert important influence on gross receipts and net earnings in any adjustment period. This influence was favorable for cotton, decidedly unfavorable for barley, and somewhat unfavorable for melons and cottonseed.

(7) New farm legislation permits farmers to expand acres with the provision that cotton price supports will be lower on the expected greater production. The relative degree that cotton production and marketings rise and prices decline will determine whether this legislation will afford farmers an opportunity to increase their cotton and total farm earnings.